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Life and Mining in the Tropics.

BY G. M. COLVOCORESSES.*

It seems to be a difficult matter to generalize on tropical climate and its influence. The tropics present the greatest variety of climate to be found in any zone, being largely modified by winds, moisture and obviously by altitude, so that to a certain extent each particular section forms a special problem.

Australia.—In the northern part of this country, especially Queensland, the heat is most intense; the thermometer often reads 120° F. in the shade, as it does in the Arizona Desert; because of the danger of sunstroke, it is difficult for white men to do any outdoor labor there, even though the humidity is comparatively low. There is little cool weather during any part of the year; I have noted 100° F. in September, a month which corresponds to March in the northern hemisphere. The long protracted heat wears a man down to a low vitality, and lays his system open to all kinds of nervous diseases, as well as liver complaints and low malarial-fevers, though the latter are found to diminish greatly as the country is opened.

The New Hebrides.—These islands, some 1,000 miles east of northern Queensland, offer the worst tropical climate with which I am acquainted; it is similar to that found in the Solomon islands and New Guinea. These islands cannot yet take rank as mining countries, though phosphates are worked near by, and "volcanic" sulphur exists on them. Some years ago extensive preparations were made to work one of these sulphur deposits on the island of Vanva Lava; it was largely due to the climate that the attempt was abandoned, but only after about $200,000 had been spent on installation, including a Bleichert tramway some five miles long. The French and Swiss engineers in charge, together with about 80% of the white foremen and laborers, were prostrated by a fever; the mortality was so high that nearly the whole working force left in a body, many being carried on board the steamer.

In January, which marks midsummer and the rainy season, I have seen 106° F. in the shade, and a humidity so high that showers fell every few minutes; they seemed simply to be "squeezed" out of the supersaturated atmosphere. It is impossible for whites to do manual labor in the open, except during the short cooler season, when the weather moderates a trifle. Even Chinese coolies cannot work regularly there, and the black natives, who perform all the work done, can hardly be described as strong or energetic. Yellow fever does not exist, but everyone who lives on the islands is subject to a "malarial" fever, caused by the rotting of the rank vegetation which continually permeates the woods with a most disagreeable nauseating odor. This fever, if rarely deadly, is most unpleasant, reducing one to skin and bones, and frequently bringing on blindness, deafness, etc. Moreover, once caught it is very difficult to get out of the system; attacks often recur a few months apart for years after one has moved to a cool and healthy climate.

New Hebrides fever prevails in an even more virulent form in New Guinea, the Solomons and New Britain; yet everywhere one finds white men who have lived there for years. They all suffer from the fever, but those who are strong enough to get through the first few seasons and become "acclimated," enjoy fairly good health during the greater part of the year, suffering from only one or two mild attacks per annum; but I am told that these men can rarely live again in a temperate climate, where the fever comes on them with greatly increased force.

New Caledonia.—This offers perhaps as good a tropical climate as can be found, resembling that of the West Indies and the Hawaiian Islands. It is really a healthy country. Stretching from 18° to 21° S. latitude it is cooled almost daily by the southeast trade winds which blow up the longer axis of the island. Although in parts it is infested with mosquitoes, yet, strange to say, no malarial fever exists there, due probably to the rather sparse vegetation in the lowlands and to the absence of fresh-water swamps of any size. In mentioning this, credit should also be given to the abundant "niavlie" tree, a near relative to the Australian eucalptus, which has long been recognized as exerting a most healthful influence. Attempts have I believe, been made to transplant this tree to the Philippines and other unhealthy places; but, excepting in our own West, it has usually refused to thrive outside of Australasia.

In New Caledonia white men can work hard with no detriment to themselves. The mines are nearly all quarries or opencuts. The bulk of the labor used to consist of French convicts and "ticket of leave" men; more recently many Australians (Dalmatians and Croatians) have worked there with great success. Japanese and Chinese have latterly formed a great proportion of the mining labor; and Japanese, Hindoos and Kanaka natives have been tried with fair success. There are two distinct seasons: winter, when the temperature at night sinks as low as 45° (or lower in the mountains) and the day warms up to between 70° and 80°; and summer (which is also the rainy season), when the nights are rarely cooler than 75° and the days vary from 85° to 95°; the maximum which I noticed in a three-years' residence being 100 degrees.

Still New Caledonia is a tropical country, and one coming from a temperate zone must make up his mind to change his mode of living to a certain extent if he would avoid serious consequences. Among the native population and the Asiatics certain diseases are always more or less common; as leprosy, beri-beri and an occasional epidemic of bubonic plague. All these diseases may be, and are, communicated to the whites; it is well to avoid personal contact (as hand-shaking with these people) and to be careful that those employed as house servants are clean and healthy specimens of the race.

In traveling, a portable tent should be taken; one should never sleep in a native hut, nor in any old deserted building; these are always full of fleas and worse insects, whose bite may innoculate disease as well as that of a mosquito. It is well known that rats die of bubonic plague wherever it exists; now the fleas frequent the rats and the natives alternately, and these spread this disease with marvelous rapidity. This, I believe, is also true in India. These are not pleasant subjects to dwell on, but it is well for everyone expecting to visit tropical countries to have some knowledge of them.

It seems that residence in any tropical country causes the blood to become thinner; the body loses some of its "vital force" and power to resist disease. Thus slight cuts or wounds take a long time to heal; the danger from blood poisoning frequently results in loss of a limb, or even of life.

In New Caledonia the diseases most common among the whites are: dysentery, chronic indigestion, liver complaint (often ending in abscess of the liver), prickly heat, and heat prostration. Add to these nearly all the ills more common in temperate zones, especially the typhoid.

Now, every man owes it to himself and to the people for whom he is working, to keep as well and strong as possible, otherwise his health and his work suffer in proportion. The ratio of value between prevention and cure is long established; leaving the latter entirely to the medical men, I venture some laymen's remarks on the former:

Dwellings.—In making short trips, tents or portable sheet-iron huts are suitable to sleep in; but unless they can be placed in a shady spot, the sun will make them unbearably hot in the day time. With 98° in the shade outside, I have noticed 120° in an unlined iron house standing in the sun. When stops of a few days are to be made, a much cooler hut can be built of rough poles with sides of grass-thatch or bark, and no expense other than a few hours' labor. These, however, have the disadvantage of being attractive to the insects and reptiles which happen to be in the neighborhood. Sleeping on the ground is a bad and often dangerous practice; a

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portable cot should be taken; or, failing this, a good raised "camp bed" may be constructed of sacking, or from a blanket and light sticks. Above all, don't forget a piece of mosquito net. A permanent dwelling should always be constructed on raised pillars of masonry or wood, at least two feet from the ground. If square timber and clapboards are obtainable, they make the best houses; but if not, a frame of round timber with walls of some kind of adobe clay is good, but not very durable. Sheet iron or thatch makes a good roofing; under either, an air space should be left; also a ceiling over the rooms, made of boards or heavy cloth sheething. A broad veranda, if possible, on all four sides of a house is most desirable and makes the interior much cooler. One should always chose a location near to a supply of good drinking water; a bathing pool close by will prove not only a luxury; but a great aid to good health and good spirits.

Food.—This is certainly the most difficult problem which has to be faced in the tropics; not only must the engineer solve it for himself, but usually also for the men working under him, some of whom will have to be taken care of like children. Wherever permanent work is going on, an ice-machine is certainly a good investment; one capable of making about 150 lb. of ice per day can be bought for from $500 to $700, and can be run with belting from any stationary engine. The type with which I am familiar required about 4 horse-power, and needed but little attention, except oiling and refilling.

Meat should be hung up in as cool a place as possible, and enveloped in a clean white cloth or paper, which will protect it from dust and flies; but even so in hot weather it will keep fresh only 36 to 48 hours. Where beef cannot be obtained, the common substitutes are goat flesh and poultry. Goats will live almost anywhere; when well cooked, the kid's meat is really delicious. To anyone settling far from cattle pastures, a small herd of goats will prove a great blessing, furnishing both meat and milk. Poultry, especially chickens, become in time a most tiresome fare; still, they are better than the canned meats, which, if bought on the spot, may be years old and savor strongly of the famous "embalmed beef" of our Spanish-American War. Fish is a most pleasant and refreshing dish, but one has to be very careful what fish he eats. Many of the fresh-water fish are so tasteless and flabby as to be worthless, and some salt-water fish are absolutely dangerous. Coral reefs usually abound in the tropical seas, and during a part of the year a flower grows on this coral (generally inside the reefs, or atolls), whose pollen the fish are fond of. This diet renders the fish poisonous, and persons eating them are inflicted with a most painful itch, or "grat," which in some rare cases proves fatal. People who have once suffered from a severe attack of this itch are often unable for years afterward to eat any salt-water fish at all without bringing on a more or less severe attack.

Often there is a great lack of fresh vegetables; I believe much tropical sickness can be laid to their dearth. Thus, at the Nepoui mines, in New Caledonia, the Chinese and Japanese coolies had plenty of fresh meat (beef) three times a week; but during the summer almost no green vegetables could be obtained, so that the vegetable part of their diet was almost wholly rice. Every year beri-beri would break out at this time, especially among the Japanese, and several deaths would result. After much experimenting, our doctor decided that a complete change of vegetable diet was necessary. He suppressed the rice entirely, substituting bread, crackers and much grease (to take the place of butter.) Also the greatest effort was made to secure some kind of green vegetable; some cabbage and watercress were obtained. The success of this new system was remarkable; whereas each year we had been having from 20 to 30 sick (out of 200 Japanese), the sumer following this change not a single new case was reported; and in old cases, when an attack came on, it seemed to be much milder than former attacks, and no fatalities resulted. Sailors on long voyages frequently suffer from beri-beri, resulting probably from sameness of diet and lack of fresh food; as a remedy for this disease, as for the scurvy, lime-juice has been found very beneficial; but the best known preventive seems to be variety in diet and fresh meat and vegetables as often as possible.

Labor Day.—In considering the welfare of laborers, which is of the greatest importance, the hours of labor form a most important consideration. Many notions acquired in temperate climates will have to be revised. In deep underground mines, obviously these remarks will not apply; but in all surface works, open cut, dredging, railway construction, etc., neither the foreman nor laborers could stand 10 or even 8 hours' work during the period of greatest heat. It is well to begin work as early as possible, to breakfast by lamplight and set to work with the first dawn, which is usually at 5.30 in summer, and 6.30 in winter. A 10-hour day may be worked on the following schedule:

Winter, A. M., 6.30-11.30; P. M., 1-6.

Summer, A. M., 5.30-11; P. M.,1.30-6.

If 9- or 8-hour days are worked, it is well to add off the extra time to the noon recess; for a rest of 3 or even 4 hours is none too long, and the men will work the better for it during the cooler mornings and evenings.

Clothing.—This is another very important matter, both for the engineer and his men. Coolies on contract usually have to be clothed by the employer; the less they wear the cleaner and healthier they usually are. A working costume consists of a cotton shirt, cotton trousers and a big straw hat; nothing more, except that in some kinds of work shoes are necessary. Very light garments will also do for the engineer; but he must have plenty of changes wherever possible, for perspiration and tropical rains may make 3 or even 4 shifts a day very desirable (but naturally only possible when near one's base of supplies). When riding or traveling by wagon or boat it is impossible to keep dry during the wet season; after a few weeks one usually stops attempting it and leaves his rain-coat behind, so that the same clothes may be soaked and dried by the sun alternately several times a day. Many prefer linen next the skin, but personally I prefer wool. A light flannel shirt and khaki trousers and coat (if worn) are to my mind ideal tropical apparel; to which add light socks; high but not heavy boots; and a very big hat. This last is most important, for not only should the crown of the head be covered, but the eyes and nape of the neck should be continually shaded, as both are most vulnerable points for the attacks of the sun. A cork or pith helmet is the coolest, lightest and in many ways the best hat that can be worn; but for traveling it is not in favor because it is breakable and easily softened by rain. A peak straw hat lined, or a "cowboy felt," with wide brim, will be found nearly as cool as the helmet, and much more durable and portable.

Exercise.—While it is true that one cannot take the same violent exercise in the tropics as in colder climates, yet I believe that sufficient exercise is one of the greatest requisites of good health; the man most to be pitied is the one who is continually shut up in office or warehouse. During the greatest heat, say from 9 A. M. to 3 P. M., it is well to keep in the shade as much as possible, or at least to take things easy if obliged to be out in the sun; but in the early morning and late evening, regular outdoor exercise should be taken, whether one feels like it or not. One reason why the English have been able to colonize tropical countries better than anyone else is that they insist on getting their sport and exercise; wherever there are English, one sees tennis, cricket, brating and occasionally football. Where these pastimes are impossible, riding, canoeing, swimming and walking should be made to take their place; though frequently the work of an engineer (especially if he is surveying or prospecting) will furnish enough active exercise to render artificial exercise unnecessary. Leaving regular diseases out, the stomach and liver seem to be the two human organs which suffer most in the warm countries; good water, good food, with some variety, and exercise are better than any medicine.

Wherever water, either fresh or salt, occurs in an oil stratum, it may have obtained access from the surface.

Talc in Northern New York.

BY ROBERT B. BRINSMADE.*

About six miles east of the pyrite range of St. Lawrence county,* and in a country which, though still rolling, indicates by its more rugged appearance the approach of the Adirondack foothills, extend some low ridges of upturned metamorphic strata which contain a remarkable series of talc deposits. Gneiss (hornblendic) and related schist run comformably with a belt of limestone; this is less crystalline than that around Gouverneur, and is distinguished by its thin layers of included tremolite and colorless pyroxene. The layers resist weathering better than their matrix, and often form edges projecting from the limestone. It is within and conformable to this tremolite limestone that thick-bedded veins of talc are found. On the surface the talc veins are discolored, but further down is disclosed the clear greenish-white talc, which is free from injurious impurities.

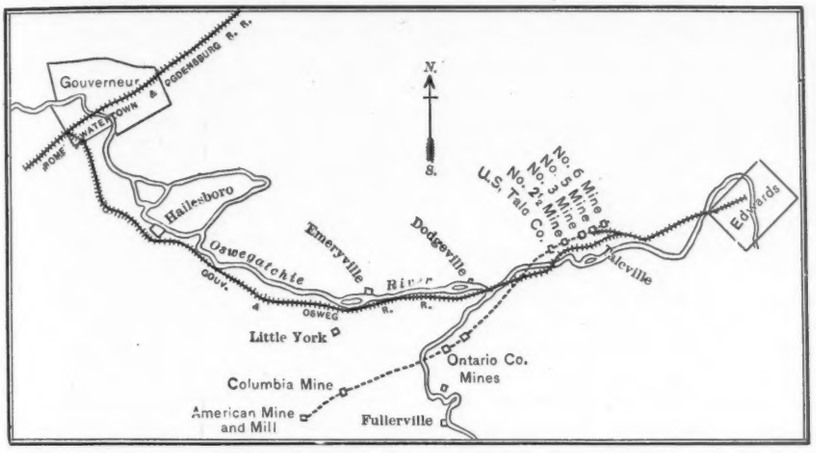

FIG. 1. MAP OF THE TALC DISTRICT.

The talc range proper has a length of 7 miles and a width of over a mile; the strike is northeast, through the towns of Fowler and Edwards. It lies on the northwest flank of a geological island of Archæan rock. Several occurrences indicate the existence of parallel talc belts. This paper will describe only the Talcville region.

On the western end of the range, two miles south of the village of Little York (Fig. 1), are the American and Columbia mines; these belong to the Union Talc Company, of Gouverneur; from three mills there is an output of over 30,000 tons of ground talc a year. In the center of the range are the three mines of the Ontario Talc Company, with one mill, whose capacity is 20 tons daily. Finally, at the eastern end, we have Talcville, with a workable vein a mile long. The United States Talc Company owns the western part of the Talcville vein, with a mill at Dodgeville, of 15,000 tons yearly capacity. The balance of the Talcville vein belongs to the International Talc Company, with four mills, only three of which are operated.

The talc bed that forms the working mines is 12 to 16 ft. thick in the Union Talc Company's mines, and dips 30 to 50° to the northwest. The vein here is white agalite, foliated or massive; these varieties are ground in varying proportions for different purposes. The foot-wall is limestone; the hanging wall a thin stratum of a biotite hydrous mica-schist.

At Talcville the vein dips 45 to 60°, and has two layers separated in places by a slip; the average width is 18 ft., but occasionally it is workable for a thickness of 70 ft. Here, too, the talc, while equally hydrated, retains physically much more of the fibrous structure of its parent tremolite than at Little York; hence it is more valuable. The scaly and lamellar rensselaerite (of a beautiful greenish-white tint, and which renders the ground talc too "leaf-like" for the better grades of paper) occurs chiefly at the west end of the district. As accessory minerals, occur quartz and pink crystals of hexagonite (tremolite); while horses of yellowish tremolite and tremolite limestone separate the workable parts of the talc bed.

Chemical Origin.—The following is the commonly accepted origin for the talc. The tremolitic beds were once a highly silicious dolomitic limestone; from this, by metamorphism, was crystallized the calcium-magnesium silicate called tremolite, with probably actinolite and other varieties of pyroxene. Where calcium carbonate was plentiful there resulted tremolitic limestone; where scarce, a tremolite schist. Given a bed of tremolite schist to produce the talc bed; for this there is necessary only circulating water containing carbonic acid; this will leach out the remaining $CaCO_3$ and render hydrous the tremolite by replacing its calcium with hydrogen. When conditions were not right for a sufficient circulation of this carbonic water, there were produced the parts of the talc bed that are too hard for grinding because of their unaltered tremolite.

Mining Practice.—The American mine furnishes a good example of prevalent extraction method. It is opened by an incline, following the foot-wall of the vein to a depth of 300 ft; for its 16-ft. width it stands well without timbering. The height of the incline is the thickness of the talc, or 15 ft. In this incline is a single skip track and a stairway for men; every 30 to 50 ft. on each side are opened wide-arched tunnels 15 ft. high. After the tunnels have advanced some 25 ft. from the side of the incline, an upraise is started to the next level; when the raise is "holed through," the talc is stoped out clean between walls, by underhand stoping, for a distance of 40 ft. along the vein. The stope is then squared down to the lower level, and tunneling is begun under the next pillar, preparatory to another upraise and underhand stope beyond. It is not usual to extend the tunnel and its accompanying stopes more than 600 ft. each way from the incline, as it is claimed that the tramming expense then becomes too heavy for economy.

Usually the bottom level is the only one in operation; but, by leaving a shelf of talc on the foot-wall of the upper level to support the car track when the raise comes up from the lower level, as many levels as may be wished can be kept open with this system, if the face of the upper level is always kept in advance of the one below. The pillars are left 25 to 30 ft. square, as the cleavage of the talc makes round pillars unsafe. By leaving a foot's thickness of talc under the mica-schist layer on the hanging wall, the roof stands well, so that no stulls nor special "roof-men" are necessary.

FIG. 2. THE U. S. MINE AND MILL.

FIG. 3. THE AMERICAN MINE AND MILL.

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The capacity of the American mill is 32 tons; for this it takes a mine force of 1 shift boss, 1 drill runner, 1 helper and 4 muckers, working the day shift only. The drill used is a No. 2 Rand, and it works on one side of the incline while the muckers are cleaning out the broken rock (from the previous day's blasting) on the other. The talc is regular and easy drilling ground; one shift can break 60 to 70 tons. This is greatly facilitated by its cleavage, along bedding planes, that causes the mineral to split off in huge slabs. A hole is loaded with 40% dynamite; this is tamped by a clay roll, 12 in. long, sent down from the surface, and is fired with cap and fuse. Care is taken that only clean talc shall be broken down; this is usually an easy matter for the whole width of the vein, except for occasional tremolitic "horses."

The broken talc is run out, in one-ton wooden cars, to the incline, and is dumped direct into a one-ton steel skip. This is pulled up to the surface by a ¾-in. steel rope. There, the mineral is dumped automatically over a car running on a trestle through the storage sheds (Fig. 3). These sheds hold several hundred tons reserve. Here the different kinds of talc can be mixed for the mill, and any chunks containing quartz or other foreign and deleterious matter can be rejected before they enter the mill to injure the grinding machinery.

A Rand straight-line air-compressor, a single-drum hoist run by a belt from the mill's line-shaft, and two 6x4x6 in. duplex piston pumps, for handling intermittently the moderate quantity of mine water, complete the mining machinery.

At the Talcville mines, the practice does not differ materially from that just described. In the very wide stopes that sometimes occur, it is often necessary to run two parallel tunnels under the pillars (instead of one); this plan leaves an enclosed talc wall that will support a back too wide for one continuous arch. Fig. 2 shows the head works of the U. S. mine; the chief peculiarity is a hoisting engine set at one side of the incline, instead of being in line. The skip rope must therefore be run for a long distance around diverting sheaves to get it in line before entering the incline's collar, with the ensuing repair expense that theory would indicate as the penalty for such poor engineering.

The Oswegatchie river flows through the talc region; its steep gradient, accompanied by numerous rapids and several falls, permits the easy utilization of its water power. The river here has a flow of 500 to 1,000 cu. ft. per sec., giving about 50 h.p. for each foot of water head on the turbines. With the exception of two that run by steam, the talc mills are located on this river at convenient water-power sites; the ore comes to the mills from the Talcville mines on the Gouverneur & Oswegatchie railroad. The mines off the railroad haul the talc to mill usually with two-horse teams; but the Union Talc Company has recently tried a steam traction-engine for this purpose. Owing to the hilly nature and often wretched condition of the roads, this engine cannot be said to be an unqualified success; breakdowns are frequent and troublesome.

Worthy of note is the central power plant for the four Talcville mines of the International Talc Company; this is in a mill (formerly used for grinding) on the Oswegatchie river, opposite the town. There are two 225-h.p. horizontal turbines, whose water supply comes from a short canal leading off from the dam just above the mill. One turbine is belted to a single drum hoist that winds up the one-ton skip in the 45° incline of the No. 2½ mine, 150 yd. away across the river, by a 1-in. steel rope supported by frequent sheaves. The second turbine is belted to a Norwalk compound air-compressor with intercooler of 200 h.p. This machine delivers air to the mines through a 6-in. steel pipe crossing the river on the highway bridge. The air is intended to run all the mine machinery, including air drills, pumps, hoisting engines and shops.

Milling Practice.—The American mill (the exterior is shown in Fig. 3) is arranged in three floors like a flour mill; the resemblance is made closer by the fine white dust that covers everything indoors. The broken talc from the storage sheds of the American mine, some 150 yd. distant, is dumped from a 1-ton car on a trestle in front of a 10 by 20-in. Farrel Blake crusher, with corugated cast-iron jaws and making 240 r. p. m. The crusher spouts directly into an 18-in. cone or "coffee-mill grinder," driven 640 r. p. m. from a bevel gear at the top of its vertical shaft, the central cone being cast in two halves to cheapen renewals. From the cone, the talc pieces, now about 1 in. diam., are raised by a 6-in. bucket-elevator (having, like all elevators in these mills, a canvas belt) to the boot of a 10-in. bucket-elevator discharging into the storage bins, between the second and third floors, that feed the Griffin mills. The Blake and cone crushers are placed between the first and second floors. This crushing plant has capacity enough in 10 hours' work to keep the balance of the mill supplied for 24 hours.

On the first floor are three Griffin mills (one being used only as a relay) with a capacity of 3 tons hourly apiece to 60-mesh, when driven 180 r. p. m. by a 14-in. leather belt. The mill discharge is sucked through a 12-in. round galvanized pipe into the top of one side of a steel settling hopper (of 10 in. diam., with a conical bottom of a slope of 45°) by a steel centrifugal fan placed at the opposite side. The coarser talc settles in the hopper cone, while the fine dust is drawn across through the fan and blown into the settling chamber. This chamber occupies one-half of the third floor, being separated from the rest by a light canvas partition to permit the exit of air but not of dust; the latter is fine enough for shipment and is swept off the chamber floor once a day.

The talc in the settling hopper is taken by a screw conveyor to an adjoining trommel. This trommel is octagonal, about 3 ft. diam. and with a fall of 6 in. in its length of 16 ft.; it revolves 30 r. p. m. and is covered with 26-mesh wire-cloth. The trommel oversize is rejected; but the undersize descends in flexible spouts to small cars (on the second floor) that run on tracks just over the six Alsing cylinders.

The Alsing cylinders (perhaps the prototypes of the Krupp ball-mills) are 6 ft. diam., 8 ft. long, and rest on horizontal journals which revolve 20 r. p. m. Each cylinder is charged with 2,000 lb. of talc and 6,000 lb. of pebbles; it revolves 4½ hours. A small central door in the cylinder is then removed and a grating (to retain the pebbles) is put in its place. The cylinder is given 15 min. more turning, when the talc dust is all emptied into a wooden hopper above the first floor. It thus takes six cylinders to grind 12,000 lb. in 4½ hours, giving a plant capacity of 32 short tons in the 24 hours. The cylinder lining is of porcelain tile; this is 2½ in. thick, is made to dovetail together, and should last about five years. The pebbles are stream flints, about 2 in. diam., shipped from Labrador or Greenland; they cost $21 per ton. The heat generated in grinding is considerable, but the only harm done is the occasional splitting of the pebbles, that are consumed to the extent of 1,000 lb. annually per cylinder.

The ground talc is now "spouted" from the Alsing hoppers to small cars, which in turn dump to the boot of an 8-in. bucket-elevator; this discharges into a second trommel on the third floor. This trommel is cylindrical, and of the same size and speed as the one already described, but with a finer wire-screen. The oversize (mostly wood fiber or broken pebble) is rejected; the undersize descends to bagging bins above the first floor. From these last bins the finished talc is drawn into 50-lb. paper bags, which are later hauled to the railroad for shipment to market.

The mill power is steam, furnished by two 125-h.p. return-tubular boilers, each 16 ft. long by 66 in. diam., with ninety 3½-in. tubes. The engine is a simple condensing Harris Corliss, turning at 90 r. p. m.; the 14-ft. driving pulley on the crankshaft is connected by a 24-in. endless leather-belt to a pulley of 8 ft. diam. on the 4½-in. line-shaft of the mill. This endless belt cost $1,100, but has stood 11 years of wear with no repairs. A suction air pump (actuated from the engine's crank-disc) circulates the water, from a neighboring pond, through the jet condenser; a part of this warmed water is fed to the boilers by a 4½-in. by 2¾-in. by 4-in. duplex piston pump.

On each 12-hour shift in the mill are one engineer, one machinery oiler, and two baggers; while on the day shift, in addition, there are a foreman, a crusher car-loader, and a crusher feeder; or a total of 11 men in the 24 hours.

The United States mill at Dodgeville, one of the newest plants, differs in several important respects from the American mill. Located just below a dam on the river, the power is derived from a canal and horizontal shaft turbines. The mill building itself is 150 ft. long by 80 ft. wide, and has three floors, only two of which occupy the full ground area of the structure. Here the discharge of the Blake crusher is fed to 30-in. Cornish rolls (instead of to a cone mill); the rolled material is elevated to four buhr-stones (instead of to Griffin mills). The buhr-stones are in four pairs, each stone being 3 ft. in diam. by 6 in. thick, and constructed by Munson & Co., of Utica. A conveyor on an incline of about 10° (with 2 in. square wooden scrapers placed 22 in. apart on a canvas belt running in a steel trough) now raises the ground talc onto a similar horizontal conveyor; this distributes the talc over a long storage bin feeding the Alsing cylinders. These scraper conveyors do the work efficiently; they obviate the need for a large settling chamber and the extra power required by the suction-fan system for removing the grinding-mill discharge.

The ten Alsing cylinders here are of the same size as those at the American mill; but an innovation is the screw-conveyor delivering the discharge from the wooden hopper underneath each pair of cylinders to the boot of a bucket elevator that lifts the talc dust to the final cleaning trommel, above the bagging bins. Other improvements are the automatic scales on the bagging bin spouts, and an inclined bag conveyor for lifting the 50 lb. sacks of talc from the storage room to the shipping platform along the switch from the railroad.

The paper mills are the chief consumers of the ground talc; the talc is very efficient for paper filling, not only on account of its fibrous felting quality, which strengthens the paper, but also because talc can be assimilated by paper stock to double the weight of its non-fibrous competitors (gypsum or slag). Lesser demands come from the makers of cheap soap, of waterproof paints, of non-conducting pipe-covering and plaster, of face and foot-powders, and of adulterated drugs.

In 1904 the production was 65,000 short tons, valued at $455,000. This was an average price of $7 a ton f. o. b. Gouverneur. The value depends upon the color and the fibrous quality, so that physical and not chemical tests are used for grading. The better grades have a pure white with a bluish tinge; the poorer have a yellowish cast. To the naked eye the shipping product of under 100-mesh fineness appears like an impalpable powder; but under the microscope the varying fibrosity of the particles is plainly seen.

It is probable than an increased demand, due to new uses and extended markets, will in the future as in the past gradually increase the production of this excellent material. First developed in the seventies, the annual production in 1880 was 4,210 tons; in 1885, 10,000; in 1890, 41,354; in 1895, 66,500; and in 1900 it was 63,500 tons. It can thus be seen that the output has been stationary for 10 years. The productive power is limited solely by the grinding capacity of the mills, as the mines can respond readily to any demand likely to be put upon them.

First Aid to the Injured.—II.*

BY M. J. SHIELDS.†

I shall now enter into detailed suggestion as to how first aid to those injured in mines can be made practicable, and how it will benefit both employer and employee.

The number of employees to be trained in each mine (I mean the first class) should be in the ratio of, say, 16 to 1; which, for a mine having 400 men employed, would make 25 men; larger classes are unwieldy. This should include foremen, assistant foremen, fire- and driver-bosses, runners, footmen, headmen, motormen and engineers (where the mine has electrical or steam haulage), miners, two or three outside men, and especially the teamster who drives the ambulance. The men should be steady, both in regard to habits and work; those who remain in a company's employ, and not transients. It goes without saying that this class of men are employed in and about the mine all day. If the mine is larger, two or more classes can be formed.

Each of the classes should have an organization; president, vice-president, secretary, and a lay instructor. This instructor should be a mine foreman or an assistant, unless someone else is especially adapted for such work. The reason I suggest a mine foreman is that they are required (by an Act of the Pennsylvania Legislature, previously mentioned) to have some knowledge of first aid. There should also be a medical director who can act as such for several classes or groups, especially where the mine is large and has one or more classes, or where there are several mines in the vicinity belonging to the same company; these different classes can be grouped together and can have a common meeting place where they can have lectures from the physician who acts as medical director.

These lectures should be supplemented by the lay teacher or instructor teaching the separate classes, in a practical way. The men should practice on themselves such methods as applying a tourniquet to a bleeding arm; the bandaging an imaginary wound; the applying a splint to a fractured leg. Two men should practice artificial respiration on a third who is supposed to be asphyxiated by gas or to be insensible from shock. Each man should practice carrying an injured or insensible man by his own strength; also how to put an injured person on, and carry him on, a stretcher with the least discomfort to the victim. They could also have informal discussions, among themselves and without restraint, of what is the proper way to dress wounds, the reasons why, etc. Of course, the men will get all these things in a didactic way in the lectures by the surgeon; but there is no knowledge like that acquired in a practical way—that is, by doing things with one's own hands. Each of the men should be provided with a book of instructions (of which there are a number published and sold very cheaply), most of them retailing at 25 cents. I think all of these books contain cuts, thus aiding materially in understanding how to render first aid.

The secretary of each class, beside keeping the records of all meetings, should also keep records of all accidents, of the name of the person injured, the nature of the accident, by whom tretaed, and the result, as far as possible.

The men should be taken occasionally into the medical room or "hospital" in the mine, and have explained to them how to use intelligently the equipment of the room.

The men should be taught something of anatomy and physiology in a practical way, avoiding all technical terms possible. Show them where the bones are. Paint where the blood vessels and important organs of the body are on a living subject. Show them the different points where compression can be made to stop hemorrhage. Say something about normal respiration and pulse rate; of the cardinal symptoms of fractures, dislocation, shock, concussion and injury of the brain. Teach them to distinguish venous from arterial bleeding; how to dress a wound in a clean manner; how to put a temporary splint on a fractured arm or leg; how to perform artificial respiration; how to dress a burn from powder or gas; how to wrap an injured man in blankets so as to make him warm and comfortable to be carried home or to the hospital; how to take off his clothes afterward with the least pain. The men in the class should also have a few "don'ts," or what not to do; such as don't get excited; don't fill the injured man with whiskey; don't send for two doctors at once—if the patient is conscious, send for the doctor of his choice; don't needlessly alarm his family—the messenger sent to

*The first article of this series was published in this JOURNAL, Sept. 16, 1905, p. 494.

†Doctor of medicine, Scranton, Pa.; formerly attending surgeon to the Emergency Hospital, Carbondale, Pa.

his home should be conservative; don't worry a man with questions; don't neglect diplomacy with the curious; don't put cotton next to a burn; don't put a chew of tobacco on a wound; don't wash a wound with water from a mine or pipe, or with water carried in a "topper"—in fact, don't wash it at all in the mine; don't remove any more of the patient's clothing than is necessary to dress the wound; don't dictate to the doctor; don't try to instruct him in his work; don't disregard his wishes; for, when the doctor comes, all responsibility rests with him.

The meetings of these classes, or groups of classes, should be open and free to other employees, who should be encouraged to come; but the 25 men selected should be specially trained and should form a nucleus for future classes. Each member should have a year's training at least. The meetings for the lectures and practical teaching should be held at least once a month, or oftener if it can be arranged. At the end of the year certain members of each class should be examined, by the medical director and lay teacher, and be given a certificate if found worthy; then he would become an ex- or passed-member, his place being filled by a novice. Thus in a year or two, one would have a good many first-aid men in each mine.

Every first-aid man should be supplied with the means of rendering such aid; I know of nothing better than "first-aid packets." They contain a triangular bandage; two gauze compresses; a ribbon bandage, and two safety pins; all thoroughly aseptic, all wrapped in an oiled paper, and covered and sealed in water-proof rubber cloth; on the outside of this is a cotton-cloth case with directions how to use the contents. One of these, I know from personal knowledge, was carried in the pocket of a miner's working coat constantly in the mine for four years, and is still in good condition, having suffered little from the wear and dampness of the mine. The packets of course should never be opened until used, for they become septic by handling. The two compresses are to put next to the wound; the ribbon bandage on the outside; the safety-pins are to fasten it; and the triangle to make a sling for the arm, or three triangles will hold a temporary splint in place on a fractured thigh. This triangle is about 40 in. at its base; it can be used as a tourniquet for the arm or leg, by tying a knot in the middle, placing the knot over the course of the artery above the wound, and tying it tightly around the limb. This triangle has plainly printed on it the numerous uses to which it can be applied to different parts of the body; if I remember correctly, about thirty. Each first-aid man should wear a button with a simple red cross, to show who he is in case of accident.

The benefits which will come from an intelligently applied first-aid are obvious. For the employers, fatal results will follow less frequently in accidents; recoveries will be speedier, and I know of nothing more gratifying to a mine foreman than to have an injured miner get back to work quickly—accidents make mine foremen gray. The benefits to the employees are, less hemorrhage and shock, relief of pain and suffering, fewer cases of blood poisoning from infected wounds; and, last but not least, less loss of time from work; in many cases loss of time means severe hardship to themselves and to their families.

The cost of starting first aid in a mine, say, of four hundred men, would not be over one hundred dollars, including material and training for the first year's work. For companies which have a number of mines that could be grouped, and where first aid could be supplied in quantity, it would be much less per mine. The cost of this system is greatest at first; it will grow less as the years go on.

Just a word to the men (employees) who take up this first-aid work. The feeling of gratification cannot always be measured by cash, for there is something (it may be divine) inborn in us that we feel, whenever we have done some good to our fellow-man, that cannot be bought.

I would not close this article without a deserved tribute to the officers of the Colorado Iron & Fuel Company for their perfect system of first aid. Not only have they taught their miners and employees first aid, but they have also established numerous emergency hospitals, and have even extended this training by lectures and practical methods in the homes of all their men.

The United Engineering Building.

The public competition instituted by the Joint Committee for the selection of architects for the planning and erection of the buildings presented by Mr. Andrew Carnegie to the American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, and the Engineers Club, resulted in the presentation of 26 sets of plans for the building. After a careful examination the Committee appointed Hale & Rogers, and Henry G. Morse, associate, architects, for the three engineering societies, and Whitfield & King, architects, for the Engineers' Club.

The plans embody a general scheme which is acceptable to the Committee which represents the Societies. It will be recalled that the frontage of the Engineering Building on 39th Street, between Fifth and Sixth Avenues, covers five city lots, or 125 ft. front and 100 ft. deep. The New York building law requires that a building shall occupy only 85 per cent. of the lot area, and advantage is taken of this requirement to have space on all sides of the building, thus giving the building a monumental appearance. The building utilizes 115 ft. of the 125 ft. front, and 90 ft. of the 100 ft. depth, the lot numbers being 25 to 33.

The Engineering Building will serve the convenience of each of the individual societies, which enter the building as Founders, and also such other organizations as may be invited to participate in its benefits. The large auditorium is on the first floor above the street, so as to make elevator service for it unnecessary; it will accommodate 1,000 persons. A large foyer and generous corridors, which give ample space for withdrawal from the large assembly hall, are provided; there is also ample provision for exit. To enable auditors in the back of the auditorium to see clearly such diagrams and illustrations as may be on the stage, the seats are arranged on a grade conforming to best modern practice in theatres. This parterre arrangement enables coat-rooms to be provided, opening from the outer corridors, and special consideration has been given to secure rapid service with large numbers in attendance. The large auditorium floor is reached from a great central rotunda on the street floor by generous stairways, and it can also be reached from carriages entering the driveway and moving continuously as they receive or discharge their passengers. The room for preparing apparatus and exhibits for the stage is conveniently served by a large freight elevator, so that heavy machinery and apparatus can be easily handled.

On the floor above the large auditorium are two assembly rooms occupying the principal portion of the area. These assembly rooms may be used independently for lecture purposes, or one may be made auxiliary to the other and used as a foyer or conversation room. The two rooms adjoining may be used in common when desired, as, for instance, for purposes of general reception or conversazione. Auxiliary smaller rooms on this floor are provided, and provision is made for the service necessary for light refreshments or luncheon.

On the floor above a number of small lecture halls are provided suitable for ordinary meetings of scientific and engineering societies, and for meeting of sections at the time of general conventions of national organizations.

It is expected that there will be a great demand, especially for the small meeting rooms, for scientific purposes. They will be supplied with electric current, with compressed air and with gas and water. The meeting rooms of all sizes will be fitted for the use of the projection lantern, and will be unique in their completeness for the purposes for which they are intended. The Board rooms of the Society floors will be large enough for the holding of small professional meetings when occasion may require.

The entire top floor is to be devoted to reading and reference rooms, to working alcoves, to rooms for photographic reproduction, and for drawing and similar library work. The roof will be specially constructed to secure the best illumination. The location of the reading rooms at the top of the building will be quiet, cool, airy, and free from dust. The floor below the library reading rooms will be devoted to the book stacks, although at first the alcove construction in the reading and reference rooms will take care of the nucleus of the future library which the Societies will bring with them. This will leave the book stack floor for growth, as the library shall increase in size hereafter. It is believed that, by the coöperation of the New York Public Library on the adjoining block, and with the interest and strength which the Societies will furnish, the library of the Engineering Building can be made the most important engineering library of the country. The Committee has tried to provide ample space to accomplish this end.

The Building is also to furnish accommodation for a large and continually increasing number of societies which have engineering or some other department of science as their principal object. It will also serve as a business office for the Founder and the Associate Societies.

THE UNITED ENGINEERING BUILDING.

By a business arrangement formed under legal advice and forming part of the deed to the property to the east of the building, a restriction has been placed which prevents the erection on that lot of a building more than 60 ft. high. This restriction runs with the land and secures light and air for the building on its eastern front above the third floor. The westerly wall is built 10 ft. within the property line, so that openings for light and air should always be left on that side and on the rear, even if high buildings should be hereafter built on adjoining property to the west and the north. The Committee contemplates finishing the building on all four sides and not merely on the south façade, in order that its monumental character may be seen and recognized from every point of view.

It may be serviceable to remind members of details which have been presented at various times concerning the organization of the holding corporation which is to administer the building for the Founder and Associate Societies. This corporation was formed by special charter in the State of New York, in May, 1904, and is called "United Engineering Society." Its nine trustees are chosen, three each, by the Councils of the Electrical, Mechanical and Mining Engineers, and control the building and are responsible for its financial administration. Its charter and by-laws have been the occasion of much careful thought by the Societies and by legal counsel, and the title to the land rests in this body corporate. The land passed to these trustees in January, and they are paying the interest and other expenses during construction. It is the unusual character of the trust and its functions which are largely responsible for the delay in beginning construction.

The contract for construction was signed in July, the excavation for the foundations was started at once, and the work of construction has now commenced. The contract limit is fifteen months to date of expected completion.

Either rolled or hammered forged steel is generally the most desirable material for ore-crushing roll-shells, although it costs 6 to 10c. per lb., against 2 to 4c. per lb. for chilled iron. Under certain special local conditions, however, the latter may possibly prove the more economical in practice. For example, chilled-iron shells are generally employed in the Joplin district, Missouri. Wrought-iron and mild-steel shells have the disadvantage of flowing, or turning over, at the ends. Cast steel is of medium price and has a medium life. Chrome steel and manganese steel have given good results, but are very expensive in first cost. Manganese steel has a tendency to work loose on the cores, owing to expansion when crushing ore, which sometimes causes the shell to split.

Portland cement is so called because the artificial stone produced from such cement was very similar in appearance to the noted building stone quarried on the island of Portland, in Dorsetshire, England.

The Cyanidation of Concentrates*—Part I.

BY BERNARD MACDONALD.†

Introductory.—In this paper, I shall not deal with the chemistry of the subject, but will confine my observations to statements of commercial results.

If the tailing of any ore after milling and concentration yields a high percentage of its value to cyanidation, the concentrate of the same ore, if ground sufficiently fine, will also yield a high percentage of its value to cyanidation. This statement expresses my belief for some time past with respect to ores generally; but it particularly refers to the ores and concentrates of the Veta Madre of Guanajuato and neighboring districts; it may also refer to any similar ores.

The physical characteristics imply that the valuable metals in the ore are contained mostly in the simple sulphides of iron and silver disseminated throughout a comparatively pure quartz or silicious gangue having only a small percentage of other metal sulphides (and no "metallics"). These are the general characteristics of the ores from the Veta Madre and associated system of veins; the concentrates resulting from the milling and concentration of such ores, should yield so high a percentage of their metallic contents to cyanidation that it would make their treatment by this process more advantageous than shipment, even under a more favorable schedule of tariff rates than now obtains with the smelters.

These conclusions are based, mainly on the results obtained from numerous laboratory tests made under my supervision on concentrates produced, in the mill of the Guanajuato Consolidated Mining & Milling Co., from ores of the Sirena and other mines of the same company; also from a study of the commercial results obtained in the cyanide plant of this company which has been treating the stamp-mill tailings after concentration on Wilfley tables for the past five months.

In March, 1904, I was commissioned to make an examination on the property, mining and milling operations, and future outlook of this company. The investigation necessary, involved, among other things, a series of cyanide tests on milling ores, made with a view of comparison with the results obtained from tests made on these ores by the Charles Butters Co. a year or so previously; also, the ascertaining whether the ore developed in the deepest level (since those tests were made) would be equally as amenable to the cyanide process.

It will be remembered that the belief was prevalent at that time (in fact, it might be said to be still prevalent) that the cyanidation of silver ores would not prove a commercial success. As was reasonable to expect, the directors of the companies hesitated to spend the amount of money necessary for the installation of a modern cyanide plant without being first assured that commercial success was at least probable.

Soon after this, the smelting companies which were in the market for mine and mill products, raised their charges on shipping ores and concentrates to such an extent that, in some cases, the lower grades returned less than 50% of their gross values to the miner. This condition made it available for the company to ascertain whether its own shipping ore and concentrate would not yield more advantageous results by cyanidation, than by shipping to the smelters.

With this object in view, two series of tests were made under my direction and supervision. The *first* dealt with: (a) the battery pulp before concentration; (b) the concentrate made by the Wilfleys; and (c) the pulp flowing as tailing from the Wilfleys.

The *second* series dealt with various experiments and investigations calculated to determine why the unconcentrated pulp and the concentrate would yield no better extraction than had been shown in the first series of tests.

(a) *Unconcentrated Mill-Pulp.*—This series was made on the pulp flowing from the batteries through 30-mesh screens and previous to concentration.

1. The pulp was tested by cyanidation, as a whole; that is, the sand and slimes, in natural proportions as they flowed from the batteries, were treated together by mechanical agitation following the general methods of slime treatment.

2. The sand and slime were separated by water agitation, and the sand subjected to the ordinary gravity-percolation treatment by the solutions.

3. The separated slime was treated by mechanical agitation with the cyanide solutions.

The strength of the solution used in the first and second instances ranged from 0.05% to 0.09%; the time of treatment in the first instance ranged from 72 to 92 hours; in the second, the time ranged from 10 to 14 days with a solution of the same strength; in the third, treatment lasted from 72 to 92 hours with a 0.3% solution.. The average extraction of values ranged: In the first, from 60% to 70%; in the second, from 54% to 58%; in the third, from 88% to 96 per cent. In the first instance, the indicated loss of cyanide ranged from 6 to 9 lb. per ton; in the second it was from 8 to 12 lb.; in the third it was only from 3 to 4 lb. The averages given above are made up from results of laboratory tests made during a period of three months or more; and these results were corroborated by other tests.

(b) *Concentrate.*—This series dealt with the average concentrate made by Wilfleys when concentrating the pulp above referred to. As produced, the concentrate constituted a rapid-leaching product and the tests were conducted on these first by gravity percolation, and secondly by agitation.

The strength of solution used ranged from 2% to 2.5% (which, by the way, I think was needlessly high and perhaps too high to obtain the best results). The time of treatment ranged from 90 hours for the agitation tests, to 14 days for percolation tests. The extraction of the gross values in these cases amounted to from 52% to 56% in percolation tests, and and from 54% to 59% in the agitation tests. The indicated consumption of cyanide was erratic, but 11 kg. per ton was the maximum, with 4 kg. the minimum. It is not assumed that these amounts would be consumed in commercial operations.

(c) *Mill Pulp After Concentration.*—The series was made on samples taken from the pulp flowing as tailing from the Wilfley tables. The sand and slime were treated together by mechanical agitation in a number of tests; then the slime was separated from the sand by water agitation; the sand, thus separated, was treated by gravity percolation; the slimes, by agitation.

In normal tests, a 0.35% solution was used on the sand; a 0.075% solution was used in the slime; these proportions were established after some experimenting, and appeared to give the best results. The percolation tests lasted from 10 to 14 days; the agitation tests on the slime, and on the slime and sand treated together, lasted from 84 to 108 hours. The indicated loss of cyanide ranged from 3 to 5 lb., respectively, per ton of slime and sand-pulp treated. The extraction of value from normal tests as indicated by the residue assays (which, by the way, were occasionally checked by assays of the solutions) gave averages on pulp, ranging from 85% to 93% of the gross value.

Means, Methods and Conditions.—In making this series, a lime treatment was given to each sample sufficient to destroy the acidity in the pulp and leave a slight excess of alkalinity. In making up averages, random tests were thrown out; only normal tests were included.

Mechanical agitation was effected by fixing the bottles in which the tests were made, in a slowly revolving wheel in such a way that the bottles turned over endwise. The bottles were filled ¾-full of pulp and solution; and equally good results were obtained from these tests in 80 to 90 hours, as were obtained by gravity percolation in 14 days.

After each sample was drained of solution, the residue was washed before assaying for percentage of extraction. The grades of the unconcentrated battery

*A paper read before the American Mining and Industrial Club, now "The Saturday Evening Club," Guanajuato, Mex.

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pulp ranged from 450 gram of silver, with 2 + gram of gold; to 550 gram of silver, with 2.5 gram of gold. The concentrates made by the Wilfleys ranged in values from the 6 to 10 kg. of silver, with gold corresponding to the proportions in the crude ore. From 40% to 50% of the value in the battery pulp was extracted from the concentrate; the remaining 50% to 60% of the values went with the tailing flowing from the concentrate.

Conclusions from Series I.—The repeated and duplicate tests in this series (which extended over three months) corroborated each other; also, the test results of Class c (mill pulp after concentration) were similar to the results obtained in the 5-ton testing plant used by the Charles Butters Co.; the conclusions were: (1), that the unconcentrated battery pulp, and the concentrate as produced by the Wilfleys, will not yield a satisfactory percentage of their values to cyanidation; (2), that it is indicated, with certainty, that the pulp flowing as tailing from the concentrators will yield from 85% to 93% of its gross values to this process.

be satisfactory, especially so, as compared with the results obtained from pan amalgamation (the process by which this pulp was treated previous to the time when these tests were made).

The following questions naturally arose:

(1) Why did the water-classified slime from the battery pulp yield so high a percentage of its value, while the unclassified pulp as a whole, and the sand after the separation of the slime, gave low extractions?

(2) Why was the extraction from concentrate so low?

The answer to question (1) is, that unclassified and unconcentrated battery pulp contains some constituents which refuse to yield their values to cyanidation; or, which affected unfavorably the extraction of values from the other associated constituents; or which, perhaps, operated in both ways. The same conditions and answer will apply in the case of question (2).

The conclusion was drawn that the deleterious constituents were removed from the battery pulp by the operation of the Wilfleys, and were included with the concentrate made by them; it was also evident, that these elements were not slime constituents, for since the tailing after concentration yielded a satisfactory amount of value to cyanidation, the deleterious material, whatever it was, was not in them. Then, as the only alternative left, it was contained in the concentrate. Investigation was centered on that, with results to be seen below.

Screen Classification, Percentage, Values, etc.

Average Value of the sample $398.00 per ton (Mex. currency.)

Screen Sizings.	Assayed		Percentages of		Ratio of values contained per ton of each classification.
	Silver Kg.	Gold Gram	*Quantity	Value	
Remained on 60 mesh	4.640	27	11.50	6	$25.10
" 80 "	5.460	46	15.00	10	40.15
" 100 "	6.660	37	30.00	23	93.40
" 120 "	6.140	43	17.75	13	52.90
" 200 "	6.000	19	10.25	6	26.95
Passed.....200 "	23.100	152	15.50	42	171.50
Totals			100.00	100	410.00

Should total $398.00.

* There was a loss of 2.5% of the quantity percentage, but this was distributed over several percentages which caused the money ratios of value to balance slightly in excess.

The Guanajuato Consolidated Mining & Milling Co. accepted this verdict; as a result, the pan-amalgamation process, previously used in treating the Wilfley tailings, is now superseded by a cyanide plant of 200 tons daily capacity which has been in active operation for the past five months; at the present time, it is doing better than our most sanguine predictions made for it.

Second Series of Tests.—This series was projected from the results obtained from the first series, a review of which follows:

It has been seen that the first experiments were made on the usual mill products of the pulped ore, namely: (a), On the pulp flowing from the mortars previous to concentration. (b), On the concentrate extracted by Wilfleys from the battery pulp. (c), On the tailing after concentration.

It has been shown, that the extraction from the first two products was too low for commercial consideration; in marked contrast, it was shown that the extraction obtained from the third product, the Wilfley tailing, was sufficiently high grade to

In metallurgical experiments on ores, the classification or sizing of pulp serves a purpose analogous to the segregation of accounts in the accounting department of a commercial enterprise. And as the intelligent segregation of accounts facilitates the detection of leaks, or abnormal expenditures and conditions; so, in a similar way, the classification of pulp facilitates the determination of the physical and chemical characteristics of such classification.

Proceeding on this theory, a sample of the concentrate was analyzed, and a series of screening tests was made, with results as set forth in the table herewith.

Table with Incidental Data.—The sample of the concentrate assayed 8.450 kilo silver, with 50 gram gold. Analysis showed 30% silica; 35% iron; 29.6% sulphur, and 1.8% lime. For values in the table, silver is taken at $40.00 per kg., and gold at $1.20 per gram.

Mineral Production of Italy.

Rassegna Mineraria (Nov. 21, 1905) publishes the following statistics of mineral and metal production of Italy for 1903 and 1904. The quantities are in metric tons unless otherwise specified.

Ores of:	1903.	1904.
Antimony	6,927	5,712
Silver	405	143
Arsenic	50	80
Iron	374,790	409,460
Manganese	1,930	2,836
Quicksilver	55,528	60,403
Gold	5,734	6,746
Lead	42,443	42,846
Copper	114,823	157,503
Sulphur	3,690,532	3,539,444
Zinc	157,521	148,365
Metals:		
Pig and cast iron	90,744	112,598
Wrought iron	177,392	181,335
Rolled steel	154,134	177,086
Tinned plates	11,275	16,645
Antimony	905	836
Silver, kg.	24,388	24,943
Mercury	312	352
Gold, kg.	63	10
Lead	22,126	23,475
Copper and its alloys	11,217	11,873
Tin	15	15
Zinc	126	189
Non-metallic:		
Boric acid	2,583	2,624
Coal, lignite, etc.	346,887	362,151
Graphite	7,920	9,765
Crude petroleum	2,486	3,543
Pyrite	101,455	112,004
Asphaltic rock	89,078	111,390
Asphalt, mastic and bitumen	35,757	30,817
Coal briquettes	724,993	903,610
Crude sulphur	553,751	527,563
Refined sulphur	139,464	163,695
Ground sulphur	139,376	189,266
Pulverized talc	6,300	6,740

The total value of the 1904 output was 294,472,153 lire ($56,833,126), an increase of 20,799,959 lire over that of the previous year.

Lead Deposits of Bedford, Ontario.

BY F. J. H. MERRILL.*

In the town of Bedford, Ontario, about ten miles west of Westport, is an interesting area of Grenville limestone, cut by calcite veins carrying galena. These veins are quite numerous and have a general east and west trend. They are all small at the surface, but have the interesting characteristic of widening in depth, so that there is geologic promise sufficient to justify the expenditure of a moderate sum in exploration and development.

During the civil war in the United States, a considerable quantity of galena was produced from shallow surface workings and shipped to the United States for making lead for bullets.

The galena occurs in nodules and strings in a calcite matrix often forming 75 per cent. by weight of the vein matter.

With the present activity of American capital in the investigation of Canadian deposits, it is probable that in the near future these veins will be developed.

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Channel Mining in California.

SPECIAL CORRESPONDENCE.

Developments in ancient gravel channels are being made at several points in different counties in California. Where such gravel is exposed it may be hydraulicked; but where covered by a lava-capping, drifting must be resorted to. Even where there is no lava-cap, if there be no fall for hydraulic work, the exploitation must be done by drifting in the channel. This work is frequently very extensive. In the Columbia Channel gravel mine, near American Hill, Sierra county gravel was recently struck in a raise at the end of an 1,800-ft. bedrock tunnel, which is expected to lead to the opening of a gravel channel on the Henness Pass for several miles. In the Forest City mine, in the same district, after searching for eight or ten years, what is supposed to be the extension of either Emigrant or Nebraska channel has been found. Both these old channels were worked very profitably years ago.

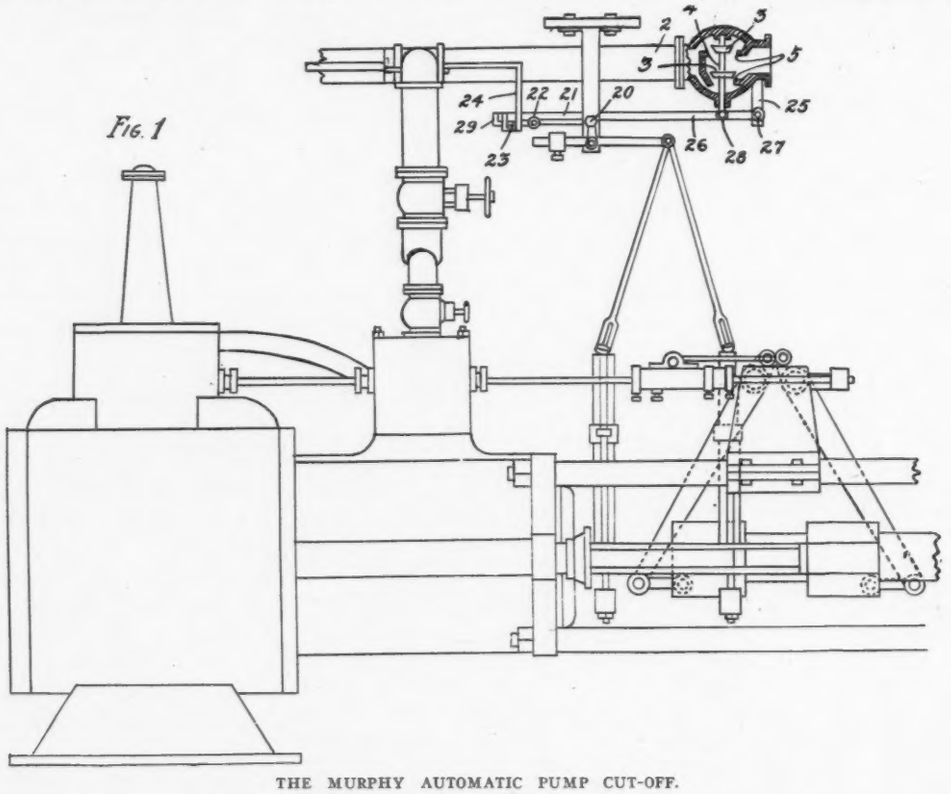
In Calaveras county, at the Hagerman ranch, near San Andreas, the Eastland-Gray Development Co., after working for about a year, has come upon what is considered an entirely new channel, hitherto unsuspected (though in a gravel mining region). The extent of this new channel is of course as yet unknown, but it is considered similar to the rich channel which made Murphy's Camp famous in the early days of California. The rocks from the deposit appear to be of more ancient origin than any in the district. A shaft was sunk 300 yd. from the river to a depth of 30 ft. and subsequently an adit was run to connect with this shaft. The subsequent operations led to surprising results.

It was found that on the top of the bedrock, at a depth varying from 20 to 35 ft., there was a stratum of gold-bearing gravel all of which would yield $4 to $10 a day to a man, and therefore would pay to exploit, although not largely. It was evident, however, that this gold was not in a true channel, and was probably an offshoot from a larger and main deposit. Exploration was therefore directed toward discovery of the main deposit. A drift was run from the bottom of the shaft toward the east in the bedrock. After driving for some distance the bedrock disappeared and did not appear again until 70 ft. had been run. In fact, the true channel had been found, but at first this was hardly understood, and it took considerable further development to disclose the nature of the discovery. Drifts were run along this channel, raises were made and winzes were sunk; finally the whole occurrence was disclosed. So far the workings show 33 ft. of gravel that will prospect all the way from 10c. to $1 a pan. In one short section $1,000 was taken out in drifting. In the winze, which has been sunk in the channel to a depth of 18 ft., the gravel grows better with the depth, and the gold is coarser.

This is an entirely new discovery. None of the geological maps that have been published give any hint of a gravel channel in this vicinity. It is now disclosed for a quarter of a mile, with such clearly defined rims that it can be accurately mapped. Its depth can only be surmised. No attempt has been made to go deeper than the 18-ft. winze, though other winzes have been sunk at different places. There is no cement and no clay; nothing to prevent free washing. Now that the channel has been defined the process of working it in a systematic manner will be commenced. The Eastland-Gray Co. owns 80 acres of this ground, about three-quarters of a mile being along the channel. A new working shaft will be sunk to a depth below the bottom of the channel and a bedrock drift run under the gravel through which the dirt will be run to the shaft and hoisted to the top.

The Murphy Automatic Pump Cut-off.

This device is used at the Resurrection Mine, in Leadville, on a Knowles compound condensing pump, raising 225 gallons per minute, against a lift of 750 feet. The shaft where the pump is located is not operated, all the working being done at another shaft, one-third of a mile away. Two firemen are required, one on day shift and one on night shift. Every morning and every evening, one of the men employed at the other shaft goes down and oils the pump; the rest of the time the pump runs by itself. The attachment is intended to prevent accident due to the pump running away or to breakage of any part. During the time it has been in use, the pump on one occasion dropped a suction valve, it stopped immediately, doing no harm. The large cast-iron "Y" at the bottom of the water column once

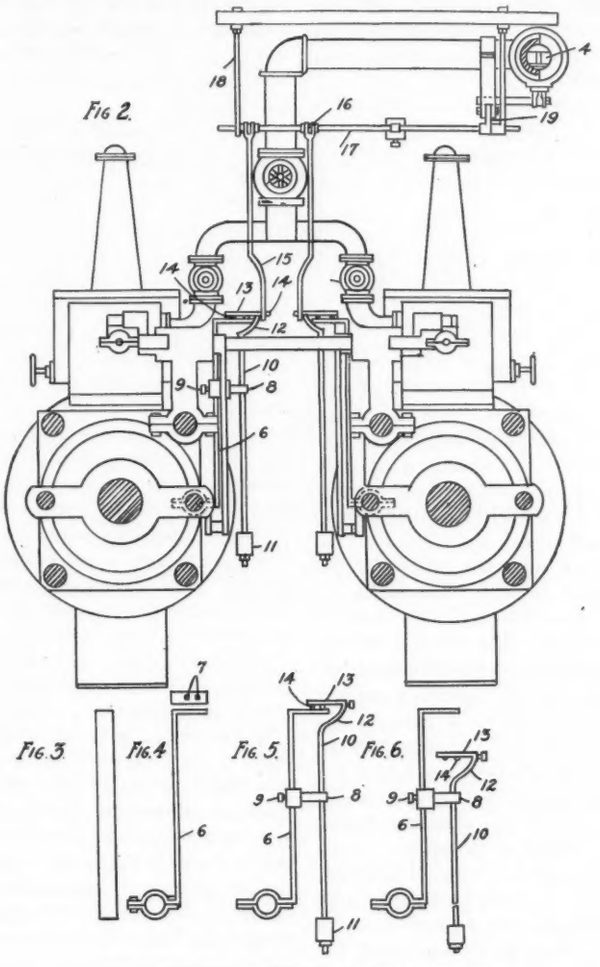


THE MURPHY AUTOMATIC PUMP CUT-OFF.

burst when no one was about and the pump stopped.

Where large quantities of water are pumped, and the operators fear to leave the pump alone, this cut-off is intended as a safeguard; it will act more quickly than any pump man, and if anything happens while he is absent, it will stop the pump before any damage is done.

Fig. 1 is a side elevation of a double-acting pump, showing the automatic cut-off arranged in operative relation with respect to the pump, and Fig. 2 is an end elevation. Fig. 3 and 4 show, respectively, a side and end elevation of the support for the gravity-operating trip-bar. Fig. 5 is an end view showing the arrangement of the gravity operating trip-bar with respect to its support, and Fig. 6 is a like view showing the trip-bar in its operative position.



THE MURPHY AUTOMATIC PUMP CUT-OFF.

Referring to the drawings, 1 denotes the double-acting pump, and 2 the steam supply pipe, which is provided with an automatically operating cut-off in the form of a double valve, as at 3, the stem 4 projecting below the pipe 2. A pair of seats 5 is provided for the valves 3.

The manner in which the cut-off operates is as follows: In case anything should happen to the pump or steam pipe, such as water in the steam cylinders, pistons over-reaching, gaskets blowing on pump or water column, dropping a valve, getting air in the water cylinder, bursting of water column, or anything else that endangers action, it will cause the pump to jar or jump during the stroke. This jar or jump causes the barbs 14 to be thrown out of the indentations 7, which will cause the bars 10 to fall by gravity, thereby carrying the elements 15 therewith, rocking the arm 17. This, moving the crank 18 in one direction, in turn carries the arm 21 with it; the latter moves the bolt 23 from beneath the right-angular portion 29, of the lever 26, causing this to fall. This, in turn, carries the stem and causes the valves 3 to become seated, and cuts off the supply of steam, discontinuing the operation of the pump.

The cut-off can be so adjusted that when the pump exceeds the maximum speed limit, the gravity-operating trip-bars 10, will be displaced so as to automatically cut off the supply of steam; the displacing of the trip-bars operates the mechanism in the same manner as previously described.

A great difficulty in the production of power from peat gas is the rapid formation of tar. This has to be separated and constitutes a serious loss of heat.

Repairing Platinum Ware.

BY ERNEST J. SWEETLAND.*

There is a method of repairing platinum ware by welding, which I have often employed with success, and although the principle is by no means new, it seems that very few chemists are conversant with it. Perhaps more skill is required in its application than in the method described under "Metallics" in THE ENGINEERING AND MINING JOURNAL of September 30, but the results accomplished are so far superior that it is well worth the extra pains involved.

When pure gold is used to repair a platinum dish, the utility of the dish is impaired; since the melting point is materially lowered. When platinum itself is used to fill the aperture, the dish is again as good as new, provided the work be well done mechanically. The method to be described is not only useful in repairing platinum apparatus, but can be applied when it is desired to connect two pieces of foil or wire.

A block of some non-conducting material for an anvil is first provided. This may be a smooth piece of fire-tile if the surfaces to be welded are flat; but if the surfaces are those of platinum crucibles or evaporating dishes, it will be necessary to make a block having the same curvature as the dish to be operated upon. This is easily done by mixing plaster of paris and pumice stone into a stiff paste with water and molding it into a block in the dish to be mended. When the plaster is set it is removed from the dish, which was previously greased, and allowed to dry slowly to avoid cracking.

The block is now rigidly mounted in a convenient position and the dish placed over it with the cleaned surface to be repaired upward. A piece of heavy platinum foil of the proper size to cover the hole is cut and kept in readiness. Now, with the blast-lamp in the right hand and the small piece of platinum held with a pair of forceps in the left, turn the flame upon the spot to be repaired; when this becomes white hot, bring the patch into the flame until it is also white hot. Now, while both parts are heated to incandescence, bring them firmly together with the forceps. The flame may now be removed and the parts examined to see if the patch has been put in the proper position; if so, the flame is again turned on, and while white hot the patch is gently tapped all around with any convenient tool. A small three-cornered file which has been rounded on its untempered end answers the purpose admirably. If necessary a piece of fine emery-cloth can be used to finish the job. If skillfully done the weld can scarcely be found after the surface has been polished.

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Sulphur in Roasting.

BY WILLIAM E. GREENAWALT.*

Sulphur, in its elementary state, does not interfere directly (but may indirectly) with the extraction of gold from its ores, by the chemical processes. Combined with some of the metals, as sulphides or sulphates, it is highly injurious; if occurring in large quantities, it is fatal. The reason for this, in the chlorination process is, not only that chlorine may combine with the sulphur, but also that the sulphur, in combination with some of the metals, is displaced by the chlorine, which itself unites with the metal or acts as an oxidizer. In either case the chlorine is consumed by the base metals and is not available for action on the gold.

Sulphur is rarely, if ever, entirely eliminated during the roasting. Frequently that which remains is not injurious to the process. The sulphur may be encased in quartz particles, or it may be in the ore as sulphates of the alkali metals or of the alkaline earths. So combined it is not replaceable by chlorine. The sulphates of sodium, potassium, barium and calcium appear to be unaffected by either chlorine or bromine.

Most of the sulphur, in gold ores, is combined with iron, as iron pyrite (FeS_2). One of these atoms of sulphur may be distilled, or be burned to sulphur dioxide at a low temperature. In the roasting of sulphides, sulphur dioxide is exclusively formed. In the presence of air, by catalytic action with indifferent substances such as silica or iron oxide, there is always formed a small amount of sulphur trioxide which, with the moisture of the air and that contained in the fuel gases, gives sulphuric acid.

The elimination of sulphur from concentrate or heavy sulphide ores, is accompanied by the evolution of considerable heat. Concentrate containing from 25 to 35% sulphur is frequently roasted down to 5% by the heat generated from its own oxidation. Thirty-two parts of sulphur, in combining with 32 parts of oxygen (that is, forming SO_2) evolves 71,000 heat units; and, if the oxidation proceeds to the formation of SO_3, 103,000 heat units are evolved. These figures may be compared with those which correspond to the passage of carbon into CO and CO_2, when 29,000 and 97,000 units of heat, respectively, are evolved.

The elimination of sulphur, in roasting, varies greatly with different ores. Some forms of pyrite are more difficult to roast than others. Unoxidized ores from the deeper levels of a mine are harder to roast than the partly oxidized ores at the surface, even though the sulphur contents of both are approximately the same. The chemical composition of the ore, aside from its sulphur content, has much to do with the roasting. Ferrous sulphate, for example, is much more easily broken up than zinc sulphate, or than the sulphates of the alkalies or of the alkaline earths. Ore containing much lime is likely to be high in sulphur after roasting.

In some of the Cripple Creek ores having 2.75% sulphur, the best extraction is frequently made, and without undue consumption of chemicals, when the roasted ore contains from 0.60% to 0.80% sulphur. When the total sulphur in the roasted ore is less than 0.40%, the tailing is usually high. Other Cripple Creek ores, which are partly oxidized, give the best extraction when the sulphur is from 0.30% to 0.50%, the insolubles usually going from 0.03 to 0.08%, and the solubles from 0.25% to 0.40 per cent.

It is customary in many of the mills to make frequent sulphur determinations. Sometimes they are made for each shift for every furnace; sometimes, once a day. These sulphur determinations are made both for the soluble and the insoluble sulphur. The insoluble sulphur is more particularly relied upon to indicate the roast. The soluble sulphur is that which is soluble in boiling water; usually a little sodium carbonate is added before boiling.

The progress in the elimination of sulphur, when treating 100 tons of Cripple Creek ore daily in large mechanical furnaces, is shown by the following samples taken at the various points in the furnace during the roasting. The ore remained in the furnace about 2¾ hours, so that the distance, in feet, from the feed, will also closely represent the time in minutes for the ore in the furnace, when the respective samples were taken. The ore was rabbled every 17 seconds. These results are averages of a large number of sets of samples taken from three different furnaces. The samples were taken to fairly represent the total cross-section of the ore. No. 3 was taken from a type of furnace totally different from the others. The ore before roasting was crushed to 12 mesh.

Furnace No. 3 was fired at a lower heat than the others. Notwithstanding the high sulphur content in the roasted ore, the extraction by chlorination was about the same. The tailing from No. 2 was somewhat higher than that from No. 1. This was doubtless due to the fact that in No. 2, with three fire-boxes, the ore had to be roasted at a higher temperature than in No. 1, which had four fire-boxes.

It will be noted that most of the sulphur was driven off early in the operation, and before passing under the first fire-box. This is a practical demonstration of the instability of the first atom of sulphur in iron pyrite. The difficulty of eliminating the last 25% is apparent. The difficulty of eliminating the third 25% is considerable. Only a small fraction of the total sulphur is expelled during the last 60 ft. of the roasting, while a large portion (about one-fourth) still remains in the ore. The difficulty of roasting even a low-sulphur ore down to a trace is evidently as difficult as to extract all but a trace of the gold. Roasting sulphide ores "down to a trace in sulphur" and "extracting all but a trace of the metals," are operations which are frequently spoken of, but rarely truthfully realized.

Within certain limits, the sulphur content of the ore does not appear to affect the extraction; beyond these limits the effect is marked. Nothing is gained in the extraction by roasting the ores represented in the tables given herewith to, say, 0.05% insoluble and 0.20 to 0.49% soluble sulphur, while the extra cost of roasting to such a low sulphur content would be enormously increased. There would also be danger of high tailing from overheating.

Some of the essential features of roasting are to find the sulphur determination which will give the best results, and to find the point where a lower sulphur content will not appreciably increase the extraction. The sulphur in the roasted ore from one mine or from one district, which has been proved to give good results, might be fatal to the treatment of ore from another district. This is largely due to the way in which the sulphur is combined. Soluble sulphur, as sodium or potassium sulphate, is unaffected by chlorine; if the same amount of sulphur were combined with iron, as ferrous sulphate, the roast would be absolutely worthless. Again, the insoluble sulphur, as barium or calcium sulphate, is not particularly detrimental to the subsequent chemical treatment; but, if the same amount of sulphur is combined as sulphide, it is almost sure to be fatal. Insoluble sulphur does not necessarily imply that the sulphur is in the form of sulphide.

In the roast (as shown in the following tables) the iron sulphate was practically eliminated at 100 ft. from the feed, and totally eliminated at 120 ft. In some instances it was totally eliminated at 100 ft., as was shown by the ferricyanide test, which did not produce the usual delicate reaction for iron. The ferricyanide test (beyond a rough determination for sulphur) is absolutely worthless, since it shows only the sulphur combined with the iron as soluble sulphate. It frequently happens that the ore is far from being roasted, when the sulphate of iron is all decomposed.

The barium chloride test is also worthless, since it precipitates sulphur that might be considered as perfectly harmless. If the ore, as shown in the tables, had been roasted so thoroughly that no sulphur is precipitated with barium chloride, it is safe to say that only a comparatively few tons could be roasted in a day, and the tailing would probably be high. A considerable temperature would be required to break up the sulphates of the alkaline earths, and such a temperature would be detrimental to the extraction of the metals.

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A direct sulphur determination seems to be the only way of indicating the roast with any degree of certainty. It is not so much a matter of absolute refinement in the sulphur determination as long as the results are uniform. Nevertheless care and accuracy are essential to uniformity. The essential idea of the sulphur determination is to indicate the quality of the roast as compared with the extraction. It is not very material whether it is high or low. If a certain sulphur determination indicates a good or a bad roast one day, theoretically at least, it should indicate the same at any other time. It is evident that this cannot always be realized, because the working conditions of the furnace should average about the same in sulphur. If the ore comes from different mines, or from different levels of the same mine, it should be mixed. Extreme care in mixing is neither necessary nor profitable. It is more economical to build the furnace of ample capacity, so that any small variation in the ore will naturally be taken care of, under uniform conditions of operating the furnace.

Careful tests have demonstrated that an abundance of air is conducive to the formation of sulphates. Air does not appear to be necessary to decompose sulphates; nevertheless, when it is supplied in abundance, the decomposition of the sulphates is greatly facilitated.

FURNACE No. 1 (4 Fire-boxes).

Sample Taken. Feet (also Approximate Time in Min.) from Feed.	Distance of Fire-box from Feed in Ft.	Sulphur, %			Difference and Difference in %	Per Cent of Sulphur Compared to Raw Ore.	Per Cent Sulphur Compared to Sulphur Eliminated.
		Insoluble.	Soluble.	Total.			
Raw ore.....		2.60	0	2.60			
45 ft. (min.)...	55	0.86	0.34	1.20	1.40 : 76%	54%	76%
65 " " ...	72	0.41	0.49	0.90	0.30 : 16%	65%	92%
100 " " ...	120	0.23	0.60	0.90	0.07 : 4%	68%	96%
160 " " ...	140	0.14	0.63	0.77	0.06 : 4%	70%	100%
Cooler.....	...	0.10	0.66	0.76	0.01		

FURNACE No. 2 (3 Fire-boxes).

Raw ore.....		2.58	0.00	2.58			
45 ft. (min.)...	...	1.54	0.19	1.73	0.85 : 45%	33%	45%
65 " " ...	72	0.74	0.40	1.14	0.59 : 31%	56%	86%
100 " " ...	120	0.35	0.51	0.86	0.29 : 15%	65%	91%
160 " " ...	140	0.16	0.54	0.70	0.16 : 8%	73%	100%
Cooler.....	...	0.14	0.62	0.76			

FURNACE No. 3 (Revolving Hearth).

Raw ore.....		2.54	0.00	2.54			
35 min. from feed.....		1.12	0.29	1.41	1.13 : 73%	44%	73%
70 " " "		0.30	0.80	1.11	0.30 : 20%	56%	93%
105 " " "		0.17	0.93	1.10	0.01 : 1%	56.4%	94%
165 " " roasted ore..		0.10	0.90	1.00	0.10 : 6%	60.4%	100%

tion of the furnace changes from time to time. For example, ore which is overroasted four hours on a shift, and underroasted the other four, if averaged might give the same sulphur determination as ore which had been evenly and uniformly roasted for the total eight hours; but the tailing would be entirely in favor of the latter roast. Unless it is known that the conditions of operating the furnaces have changed, it is fair to assume that they have remained the same, and this is usually the case in well conducted mills.

The tables of the progress of roasting give a fair idea as to the rate of decrease of the insoluble sulphur and increase of the soluble sulphur. After the first 70 ft., the principal result accomplished by the roasting is the changing of the insoluble sulphur to the soluble.

It sometimes happens that the sulphur in the roasted ore from the cooler is higher than at the discharge from the furnace. This may be accounted for by the fact that the rabbles frequently push more or less partly roasted ore ahead of them in the grooves made by the preceding rabble.

In order to get uniformity in the roasting operation and in the roasted product, it is essential that the raw ore fed to the

Hand-Drilling Championship.

The contest for the hand-drilling championship of America, organized by the American Mining Congress, took place at El Paso, Texas, on Nov. 18, 1905. The contest was won by Louis and Mark Page, natives of California, who are engaged in mining at Bisbee, Arizona. Louis Page has been a driller for 18 years, and his brother for only 2 years. Last Fourth of July they won the championship of the Pacific slope at the miners' jubilee at San Francisco, making a record of 42¾ inches.

Louis Page has been in a number of drilling contests. His greatest achievement was winning the gold medal, valued at $250, in the triple-hammer contest in San Francisco in 1905, making the record of 43 11-19 inches.

The final results of contest were:

	1st Score.	New Score.
Page Brothers.....	36 13-16"	40 3-16"
Chamberlain and Make..	40"	36⅞"
Bradshaw and McIvor....	39 5-16"	39⅝"
Lindquist and Olson.....	39 1-16"	37 13-16"

The time was 15 minutes.

Pozzuolana, made from certain volcanic ashes around Mt. Vesuvius, was simply ground fine and required no clinkering; it was used by the Romans as early as 2,000 years ago.

Brimstone Versus Pyrite for Wood-Pulp Manufacture.*

BY HERMAN FRASCH.†

Wood cellulose, especially the kind known as "sulphite pulp," has become a most important factor in the manufacture of paper; in fact, all grades of paper, from the coarsest wrapping and ordinary newspaper to the very finest writing paper, are made wholly or in part from wood fiber.

The manufacture of wood fiber is conducted on an enormous scale. Forests have been cut down to furnish the ever-increasing demand for paper stock. Many kinds of wood are employed, each having its own properties and requiring somewhat different treatment; but, as a general rule, that wood which is most plentiful and which can be cooked into pulp with the smallest amount of chemicals is preferred. The process itself is simple, but many years elapsed before the industry was developed to its present state.

After being cleaned, the wood is cut into small pieces, and boiled in digestors (which are coated with an acid-proof lining), with a solution of sulphite of lime containing sulphur dioxide in excess. After the wood has been boiled, the "sulphite liquor" is drawn off and thrown away, the remaining fiber being washed and treated like any other paper-stock. The chief cost, besides the wood and the labor, is represented by the sulphite solution.

In America, brimstone is now used exclusively to furnish the sulphur dioxide, which is the active ingredient in the sulphite solution. The sulphur is burned in a current of air, the oxygen combining with the sulphur to form sulphur dioxide (which is a gas); while the 80% of nitrogen contained in the air goes to dilute the sulphur dioxide formed. With the proper apparatus, however, nearly the theoretical amount of sulphur dioxide which the air is capable of producing is attained by the burning of the brimstone. At the same time practically no sulphuric acid is formed, all the sulphur consumed being formed into sulphur dioxide; which is the only combination of sulphur which can be made available in the sulphite process. Any sulphuric acid formed during the combustion of the sulphur is lost, not only as far as sulphur is concerned, but it also neutralizes an equivalent quantity of lime, forming sulphate of lime; this is inert as far as its effect upon wood is concerned, largely because calcium sulphate is rather insoluble in water.

The gases coming from a sulphur furnace are drawn by pumps through milk of lime, or forced into a tower containing limestone, where water trickles downward in a direction opposite to the ascending

*A paper read before the New England Section of the Society of Chemical Industry, Boston, Dec. 1, 1905.

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current of gas; the object being to form as highly concentrated solution of sulphite of lime in sulphur dioxide as possible. The reasons for making a highly concentrated gas are as follows:

1. The same pumps will deliver within a given time more active material for the same power if the gas is strong than they would if the gas were weaker.

2. The highest concentration of the solution is possible only when the gas contains the greatest amount of sulphur dioxide.

The large amount of brimstone consumed by the sulphite-pulp industry makes crude sulphur an important item for the sulphite manufacturer: First, because he must have it in order to manufacture at all; second, because it should be as cheap as possible.

Until within the last five years, practically all the sulphur of the world came from Sicily. This condition gave the Sicilians a complete monopoly of the sulphur business. Prices would rise or fall according to existing or expiring combinations, as the case might be. Within the last five years the consumption of sulphur has increased to such an extent that the output of Sicily alone would not have been sufficient to supply the world's demand; and, if it were not for the advent of American sulphur, the price of brimstone would at present be high indeed, and with no visible stocks available. However, American brimstone has forced its way to the front. From a small beginning, enormous quantities are now being produced and shipped; not only does the American production today exceed the consumption of the United States, but the sulphur mine in Louisiana is capable of supplying the requirements of the world. This insures uniform, and very likely, lower prices for sulphur in the future, and assures the sulphite manufacturer of uniformity of supply. At different periods in the past, the price of sulphur has been raised artificially to such a degree as to make it desirable for the pulp manufacturer to find a substitute for brimstone; the cheaper pyrite would naturally be the material first employed.

A number of European concerns use pyrite; some wholly, others in part. In Sweden also, where pyrite can be obtained locally near the mills, some pyrite has been introduced. The chief reason for this is that Sweden suffers from high freight rates from Sicily; many Swedish manufacturers use refined distilled sulphur in their sulphur burners, so that the brimstone which they employ is much higher in price than that available in this country. But a number of manufacturers (especially those who have adapted only a small portion of their plants to pyrite) have told me that several peculiarities have shown themselves in the use of pyrite, which became apparent only after the change from sulphur to pyrite had been made.

The most important of these peculiarities is the fact, that the air which is drawn into the pyrite furnace is deprived of a portion of its oxygen because of the oxidation of the iron in the pyrite, whereby only a part of the oxygen in the air is left available for the oxidation of the sulphur. In consequence of this, the inert nitrogen in the air deprived of its oxygen by the cinder, tends to dilute the gas, so that a lower sulphur-dioxide content will result. This means that the same pumps and the same digestors will have to be operated on weaker material, and will turn out less pulp in the same length of time than if a straight sulphur furnace had been employed.

In American works, pyrite has not been able to obtain a foothold, because pyrite consists chiefly of 47% iron and 53% of sulphur. The great distances at which sulphite mills are scattered—often a great distance from the seaboard—and the cost of transportation and handling of a material containing 47% of useless cinder, does not make the use of pyrite in itself very enticing. Sometimes cupriferous pyrite is used; in that case, the return of the burned cinder to the smelters becomes necessary. But the smelters are generally some distance from the pulp mills, and the freight is so high that no saving can be accomplished.

Another serious objection to the gas from pyrite is, that the red-hot cinder itself has a catalytic action; it converts a portion of the sulphur dioxide into sulphuric acid or sulphuric anhydride. Whatever sulphuric acid is formed represents a loss in sulphur as far as pulp making is concerned.

Further, if great care is not exercised in regulating the feeding and discharge of the furnaces, the unburned or fixed sulphur in the residual gas-cinder may run quite high. I have seen a cinder analysis from a paper mill in Sweden, in which the sulphur content amounted to 7%. When the air admission is not perfectly regulated, the amount of sulphuric acid which may be formed in the pyrite burner varies greatly, so that the absence of perfect regulation in a pyrite burner may cause a large loss of sulphur on this account, as well as because some sulphur is left unconsumed in the cinders. The same plant which operates on a gas containing 12% of sulphur dioxide cannot produce as much solution, nor of such strength as it could if it used a gas containing 17%; in fact, this also holds good as far as the capacity of the digestors is concerned.

The fine dust emanating from the pyrite burners has been proved to make paper pulp go back in color. A yellowish tint in the injured pulp becomes visible, sometimes even after it has been made into paper. The careful exclusion of this fine pyrite dust is a serious matter, and constitutes one of the chief objections to the use of pyrite.

It has been demonstrated that a sulphite plant will lose in capacity of output if changed from sulphur to pyrite, unless the capacity of the gas pumps and digestors is increased when the pyrite ovens are introduced. The amount of space occupied by a pyrite furnace is also much greater, and the installation is much more expensive, as compared with the space and installation cost of a sulphur furnace. In the handling of the pyrite, and in the removal of the cinder, a great deal of labor is involved; this is not so apparent in a country where labor costs less than one-third of what we pay in America.

On the other hand, the labor and attention necessary for a modern sulphur furnace (which will furnish a high-grade gas at all times without skilled handling) is so small that it cannot be compared with the cost of operating a pyrite burner. Further, the cost of maintenance of a pyrite-burner plant is quite high; while the best rotary sulphur furnace will last for years without deterioration.

When the high costs of installation, of maintenance, of possible loss in sulphuric acid and cinder, together with the high cost of labor and the necessity for the close watching of a pyrite furnace are compared with the automatic sulphur burner of today, the question of the extra cost of sulphur itself disappears entirely. American mills would not, and could not, use pyrite, even if they were in a position to obtain it free of cost.

The general brimstone situation of today is secure as far as supply and prices are concerned; the monopoly of Sicily has been completely broken with the advent of American sulphur. It will be much more advantageous to the sulphite-pulp manufacturer to instal the modern sulphur burner than to attempt to change to pyrite.

The British *Board of Trade Journal* of Sept. 7, 1905 (quoting from the July report of the Yokohama Chamber of Commerce) states that a phosphate deposit has been discovered at Hannoura, Nanao Bay, Noto Province, Japan. A merchant of Osaka has obtained a large concession in this district. The deposit, a layer of 30 ft., extends under the sea. The concessionnaire intends to establish a factory at Nanao for manufacturing fertilizers.

W. G. Crosthwaite, of Leeds (British patent 20,842, Sept. 28, 1904), states that a valuable alloy for making firebars is obtained by adding aluminum to molten pig iron, and then steel borings; the proportions used being preferably 100 parts of pig iron to one part of aluminum and five parts of steel, by weight. The alloy when formed may be cast into firebars in the usual way.

John Grant was probably the first modern engineer to advocate the use of Portland cement.

The Factometer.

This device is used for the purpose of measuring and recording straight line travel in reciprocating machinery. The instrument is called a "factometer," and was originally intended to register the actual piston-travel in steam pumps and other machinery of variable stoke. It is, however, applicable to many other operations, and should prove effective as a means of registering the travel of mine cages, elevators and the like.

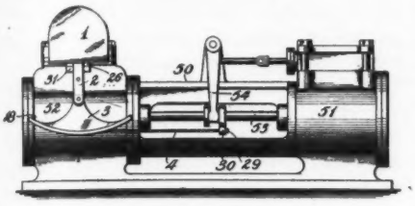

FIG. 1.

In use, the segmental arm (3, Fig. 1) is attached, either directly or through a reducing motion, to the element whose movement is to be recorded. This arm is adjustable in length and, for pumping work, the graduations thereon permit of such setting as to correct for the density of the medium pumped. In this way, for boiler feeding, the arm may be set at the scale-reading corresponding to the temperature of the water pumped; and the register reading, multiplied by a constant or factor, will give directly the pounds of water pumped.

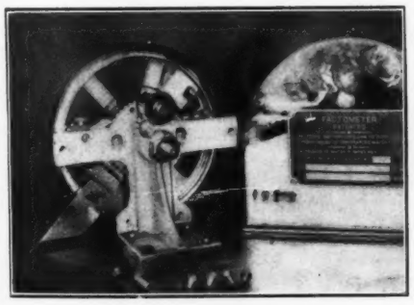

FIG. 2.

For mine cage registry, a reducing motion would be required. It is quite practicable to operate this from one of the head sheaves, or even from the hoisting drum itself. The machine is spring-actuated in so far as the return stroke is concerned.

In practice, experience shows that where weights are substituted for the spring, the inertia is apt to produce errors in registration; and, accordingly, the weight of the moving parts is reduced to a point where the inertia becomes negligible.

The operation is substantially as follows: The pull upon the cord 4 (Fig. 1) draws forward the arm 3; this causes the gripping (by small steel balls) of the wheel-like ball race shown in Fig. 2, drawing the latter forward and revolving the small gears shown. These latter mesh with an indicator or register (which is graduated to read revolutions), and by the use of a constant, or multiplier (determined by the specific purpose for which the device is intended to be used), give the desired record. The spring holds the cord taut while the arm is returning. This device registers only on the forward stroke; the ratchet shown is provided to vary the tension of the return spring.

The device was designed by the well-known firm of Sanderson & Porter, consulting engineers, of New York City, and has been used in their power-station construction for some time.

The Menominee Iron Range.*

BY JOHN L. BUELL.

It is not generally known that a tradition exists among the Menominee Indians (who were the only inhabitants of this range prior to the discovery of iron ore), that if any member of the tribe should disclose to a white man the existence of a mineral deposit, his speedy death was sure to follow. This superstition may have influenced the lateness of the mines' discovery, and of their subsequent operation on this range; for by bringing specimens (which could be readily obtained) to the trading posts, they would have incited earlier investigation. Be that as it may, it is incomprehensible why the existence of ore deposits in such vast quantity should have remained unknown for so many years.

Another embarrassment, and one of more substantial import, was the impression that iron ore of quality and quantity could exist only in the Marquette range. The geological formation of other districts, where indications of ore were prevalent, but not corresponding exactly with those of the Marquette district, seemed to preclude the possibility of the existence of paying ore. This impression was general, and was so effective as to influence the most active and noted explorers, among whom may be included such men as Credner, Pumpelly and Brooks.

Dr. Credner, as State geologist, ventured so far as to publish in his report the existence of a large deposit of highly silicious iron ore on Section 11, 39-29. Brooks and Pumpelly, with John Armstrong as guide and woodsman, traversed every section of the lower range, when making the selections of lands for the Canal company. They did no little digging, both on this and on the Metropolitan range, but in no instance did they find any deposits of standard ore, certainly none which they ever disclosed. The edict had gone forth: "There was no good ore outside of Marquette county," and, blinded with this phantasm, they strolled aimlessly over locations from which millions of dollars' worth of ore have since been extracted and millions more are yet to come.

This country of Menominee, also, was made for a purpose. These iron ranges have shown a striking example of rapid development. This is especially true of the lower Menominee range and the Iron river, Crystal Falls, Gogebic and Minnesota districts; ore has been disclosed over a territory, the value of which a short time previous, if it had any, was based solely upon the pine timber standing thereon.

The location of this district, remote from water and rail transportation, the reported severity of its climate, as also the reported bareness of its soil, all tended to divert immigrants. Saw-logs and sawmills were the only products shipped from the Menominee and its tributaries. The first 75,000 of pine logs cut on the Menominee, above lower Quinnesec Falls, was hauled by the New York Lumber Co. in the winter of 1870 and 1871, from the little point of land where the outlet of lake Fumee flows into the main river (Section 3, 39-30).

The first exploring party to enter the territory embracing the lower Menominee range, was headed by N. P. Hulst, of Milwaukee. As a representative of the Milwaukee Iron Co., he began exploration on Section 10, 39-29, in the summer of 1872. The exploration was not confined to this point, but extended elsewhere, consisting of test-pitting and trenching, with the exception of a long drift across the silicious formation on Section 10. The exploration was discontinued in the fall of that year.

In the fall of 1871, the writer, in company with John Armstrong, encamped at the little spring on the present site of the village of Quinnesec. While Armstrong was preparing dinner, a little stroll over the bluff to the west disclosed to me the out-cropping of the easterly terminus of the Quinnesec mine formation. It was not until the spring of 1873 that the title to this tract was restored; in May, exploration was begun and prosecuted until a deposit of blue ore was discovered on Aug. 3, in the same year.

When the ore was first struck, it had a width of 11 ft. of clean ore; a jasper horse, 4 ft. in width; and then 1 ft. more of clean ore. Seventy-five feet east, the deposit had a width of 33 ft., with 66% iron, 4% silica, and 0.013% phosphorus.

In the spring and summer of 1874, 55 tons of this iron ore was hauled to Menominee on sleds and wagons, and smelted in the furnace at that point, with a mixture of hard ore from Jackson and Winthrop. The last furnace charge consisted entirely of the Menominee range ore, thus establishing its tractability. Robert Jackson, superintendent at the furnace, spoke in the highest terms of the quality of the ore. This was practically the first test of standard ore from the

*Abstract of a paper read before the Lake Superior Mining Institute, October, 1905.

Menominee range, and it was the incentive to rapid and successful exploration along the entire formation.

Mines were discovered from 1872 onward. Norway, Cyclops, Curry, Saginaw, Stephenson, were the finds in 1878. Breen was found in 1872; and then explored and operated by the Menominee Mining Co., of which Dr. Hulst was manager. Vulcan was a product of 1873, through it did not ship until 1877. Quinnesec was of 1877, as was Emmet. In 1879 came the great Chapin, East Vulcan, Cornell, Keel Ridge, and Indiana. Millie came in 1880. To these should be added the subsequent and recent discoveries of Pewabic, Aragon, Loretto, Munroe, Traders, Walpole, Vivian and Cundy. Of the foregoing, Keel Ridge, Cornell, Indiana, Quinnesec, Cyclops, Emmet and Stephenson are apparently worked out and abandoned. The Indiana has closed on account of excessive water, and the Cundy is temporarily idle. Saginaw and Breen are being re-opened; Hamilton and Ludington have been merged with the Chapin; and Curry, wtih the West Vucan.

Below is given the estimated product of each mine for the year 1905, and the force at present employed at each:

Mine.	Tons.	Men.
Chapin	972,000	900
Pewabic, Walpole	530,000	533
Traders	150,000	80
Vivian	95,000	100
Munroe	100,000	90
Aragon	430,000	570
Vulcan, E. Vulcan	425,000	650
Loretto	94,000	174

This makes a total product for the year 1905 of 2,796,000 tons, with a force of about 3,000 employees.

The product is keeping up to, it not exceeding, former years, with the number of employees somewhat reduced, because of the application of improved machinery, underground haulage and improved methods of mining. The quality of the ore produced is not so good as in former years, yet all finds a ready market and no complaints are heard from the operating corporations. The scale of wages is as high as, if not higher than, ever before on the range. This standard of pay, in the face of reduced value of ore, is maintained only by the use of improved machinery and by skillful management in the raising and shipping of the product.

It is estimated that the ore is now delivered on cars at some of the mines at a cost of 60% less than in former years. When ore was worth from $8 to $12 per ton, the operator could afford to be somewhat indifferent as to the cost of production; but with a price of $4 at the end of the market, it behooves the management to exercise the utmost economy and skill in the operation of the mine.

The Chapin, by far the heaviest producer on the range, has underground electric haulage, and shows a total product up to Jan. 1, 1905 (Hamilton and Ludington included) of 13,599,378 gross tons. It was discovered in 1879 and made its first shipment in 1880. Since that date, with the exception of 1892 and 1893, it has been a constant and heavy producer. The orebody consists of a series of lenses extending easterly and westerly 6,100 ft., with a varying width of from 50 to 150 ft. The greatest depth reached in the mine is 1,460 ft. The standard ore is worked out down to the eleventh level, a distance of 860 ft.; yet large bodies remain much nearer the surface. The caving-process has been used in this mine, making it much more secure against accidents, and permitting the extraction of all the ore at a much less cost than under the old system. Under a pressing demand, 1,000,000 tons could be raised annually through the Hamilton shaft alone. The immense body of ore still in sight indicates many years of heavy production.

Exploration on this range for the past few years has been quite general, with little success. The question of formation is a perplexing one. Many theories are advanced, and each explorer seems to have his own. All seem to conclude that, when limestone (so-called) is reached, it is useless to prosecute the investigation further. This in the face of the fact, that all deposits of the standard blue-ore on the ranges are in the direct longitudinal trend of the limestone—*in* the limestone, not alongside of it. I know of no diamond-drill which has ever been placed on the range with a view to penetrating the formation immediately north of the lime-rock. They all drill away from it. Not until the limestone (with a width of four miles and a length of from 18 to 20) shall have been thoroughly cut with the drill, can anyone say that the Lower range has been thoroughly explored. With the immense deposit of ore at the Pewabic between two beds of limestone; with the Walpole in the midst of it; with the Quinnesec, Norway, Saginaw and Cyclops, and portions of the Aragon in the direct trend of an immense deposit of limestone, who can deny the plausibility of looking for standard ore *in* the limestone, and not alongside of it?

The corporations engaged in mining on the range at the present date consist of the Oliver Iron Mining Co., operating the Chapin, Aragon and Cundy mines; the Pewabic, operating the Pewabic and Walpole mines; the Mineral Mining Co., operating the Breen and Nanaimo mines; the Penn Co., operating the Vulcan properties; the Buffalo & Susquehanna Co., operating the Munroe; the Antoine Ore Co.; the Loretto Iron Co.; and Pickands, Mather & Co., operating the Vivian. This comprises all the companies engaged in mining operations at the present date on the Lower Menominee iron range.

It is in order at this point to touch briefly on another enterprise incidental to the iron-ore interest. Within the range, or accessory to it, are seven great water powers; the two Twin Falls, the Horse Race, the Upper and Lower Quinnesec, Sand Portage, and Sturgeon Falls. Four of these are unoccupied, and the immense power at hand is going to waste. The Upper Quinnesec has been for many years occupied by a large compressor plant, the air from which is used for mining purposes by the Chapin. The Lower Quinnesec operates one of the largest paper-and-pulp mills in the country. At Sturgeon Falls, the Penn Iron Co. has recently begun the construction of an electric plant to supply power for its mines.

Notwithstanding that the existence of ore in shipping quantity was fully demonstrated in 1874, and notwithstanding the heavy demand for lumbering supplies (which at that time were hauled on wagons from Menominee), it was not until 1877 that the Menominee River railroad was completed to Quinnesec. In 1880 the road was extended to Iron Mountain, and thence to Iron River, Crystal Falls and the Gogebic range. The delay in the construction of the road as far as Quinnesec arose from a matter of doubt on the part of capitalists as to whether this range would sustain a railroad costing $475,000. The road paid for its construction in its first year; and this little stretch of railroad from Iron Mountain to Escanaba, since it began operations, has paid for many hundreds of miles of track on the Western prairie. We have now three railroads penetrating the range: the Chicago & Northwestern; Chicago, Milwaukee & St. Paul; and the Wisconsin & Michigan. All are doing an ore-carrying business; this, with the other traffic incidental to the operation of our mines and the development of a comparatively new country, provides ample business both in passenger and freight traffic.

Aluminum produces skimmings of a pasty nature and containing much metal. This is on account of the fact that oxide of aluminum is actually heavier than aluminum itself, so that, instead of rising as it should, there is a tendency for it to sink. Were it not for the gas present, it is probable that the oxide would not rise at all. At any rate, the oxide does not rise to the top of the melt, as in the case of other metals, but remains entangled in the aluminum, so that when skimmed the metal goes along with the oxide. The result is a large quantity of skimming for a small amount of metal.

With a 3⅛-in. drill, using air at 70 lb. pressure, starting bit 2¾ in., and finishing bit 1½ in., the time required to drill 1 ft. is about 3 min. in soft sandstones and limestones, 4 min. in medium sandstones and limestones, 5 min. in hard granites, hard sandstones, etc., 6 to 8 min. in very hard granites and traps, and 8 to 10 min. in soft rocks that sludge rapidly. It is especially noteworthy that if a water-jet be not used, drilling in a soft, friable rock like shale may be slower than in the toughest trap.

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CONTENTS.

Editorials:

Cost of Gold Dredging..... 1169
Cadmium in Spelter..... 1169
Anthracite Miners' Certificates..... 1169
Anthracite Miners' Convention..... 1169
Novel Propositions in California..... 1170
British Columbia Mining Laws..... 1170
Amortization in Industrial Plants... 1171

Life and Mining in the Tropics, *G. M. Colvocoresses* 1153

*Talc in Northern New York, *Robt. B. Brinsmade* 1155

First Aid to the Injured—II, *M. J. Shields* 1157

*The United Engineering Building..... 1158

The Cyanidation of Concentrates—I, *Bernard MacDonald* 1160

Mineral Production of Italy..... 1161

Lead Deposits of Bedford, Ontario, *F. J. H. Merrill* 1161

Channel Mining in California, *Special Correspondence* 1162

*The Murphy Automatic Pump Cut-off. 1162

Repairing Platinum Ware, *Ernest J. Sweetland* 1163

Sulphur in Roasting, *Wm. E. Greenawalt* 1164

Hand-Drilling Championship..... 1165

Brimstone vs. Pyrite for Wood-Pulp Manufacture.....*Herman Frasch* 1165

*The Factometer..... 1167

The Menominee Iron Range, *John L. Buell* 1167

The Ontario Mining Conference..... 1176

Metallics..... 1172

Colliery Notes..... 1173

Correspondence and Discussion:

Chinese in the Transvaal, *Arthur E. Pettit* 1173

The Mines of Rhodesia, *C. S. Richardson* 1174

Nomenclature of Zinc Ores, *H. F. Bain* 1174

New Publications..... 1175

Professional Papers..... 1175

Questions and Answers..... 1176

Abstracts of Official Reports:

The Republic Iron & Steel Company. 1177

Patents Relating to Mining and Metallurgy..... 1177

*Illustrated.

News and Markets.....1178-1200

Cost of Gold Dredging.

The remarkably high efficiency of the gold dredge as a means of moving material is manifested by some of the figures of experience in California, where an average cost as low as 2.36 cents per cubic yard is reported, such a result being of course attainable only with a new dredge of the most modern and strongest construction. So low a cost, which, so far as we are aware, surpasses the best on record in straight hydraulic mining, is a very remarkable result.

Cadmium in Spelter.

The subject of cadmium in spelter and its effect on that metal for purposes of brass manufacture has been the subject of a good deal of discussion, it having been several times referred to in the columns of the JOURNAL. Some recent investigations by a German chemist indicate that a content of 0.25 per cent of cadmium in spelter is no drawback, but rather may increase the valuable properties of the metal. When, however, the cadmium content exceeds 0.5 per cent, its effect on the spelter may be rather unfavorable.

Anthracite Miners' Certificates.

The decision of the Superior Court of Pennsylvania, which was noted in our news columns last week, advances one step further the litigation in an important test case. Reference has been made to this case several times in this JOURNAL; to sum it up briefly, the suit was brought to test the validity of the miners' certificate law of Pennsylvania. This forbids anyone to work as a miner in the anthracite mines unless he holds a certificate; and a condition required before obtaining that certificate is that he must have worked at least two years in a coal mine in Pennsylvania. No length of experience in other States will serve. It will readily be seen that this condition would be a strong point for the miners in case of a strike, since it would prevent the bringing in of miners from elsewhere. In fact, it did operate in that way during the last strike.

On the trial of this case the point was made that the provision was in contravention of the Fourteenth Amendment to the Constitution of the United States, inasmuch as it made a discrimination against citizens of States other than Pennsylvania. This was not accepted by the district court before which the case was first tried. The Superior Court sets aside that decision in part. It upholds the law so far as the requirement of a certificate is concerned; but also holds that the requirement of service in Pennsylvania mines is unconstitutional and void.

The point of the decision is conveyed in the following extract from it: "When the effect of a statute is to grant privileges to citizens of the State in which the law is enacted, and to deny these privileges to citizens of other States who are similarly situated, the statute cannot be supported under the Constitution of the United States. We are not willing to decide, however, that the whole statute must be rejected because a portion of it is found to be inconsistent with the Constitution."

So far, therefore, the case has turned against the miners. It is not expected, however, that this decision will be accepted as conclusive. The case will be taken to the Supreme Court of the United States for final decision.

The Anthracite Miners' Convention.

The Shamokin convention of the anthracite miners has been the cause of some apprehension; but its outcome seems to be rather conservative. Few of the delegates appear to have been of the class which is anxious for trouble, and the proceedings indicate that the majority were quite willing to accept an amicable settlement. In fact, several proposals were made to bring about such a result; one of them being to re-convene the Anthracite Strike Commission, to act as an arbitration board. This, however, is a step which probably will not be taken.

Contrary to expectation, the convention adopted no formal statement of the miners' demands. The whole matter was put into the hands of President Mitchell and the Executive Committee; and their conditions will not be made public until they are submitted to the anthracite companies. It is practically certain, however, that the eight-hour day and the formal recognition of the United Mine Workers as a contracting party will be the chief points of their demands.

Concerning the first, we have already said that it is not a matter of great importance, under the existing conditions in the anthracite mines. Practically it does not affect the miners at all, and the reduction in time would apply only to the daymen, a less numerous and usually less considered class. That the main difference

will come on the recognition of the Union, is altogether likely. Even this does not imply the impossibility of compromise. It will depend upon what is to be understood by recognition of the Union. If it is to mean the right of dictation by the Union as to how the companies are to conduct their business, the companies cannot and will not agree to any such surrender. If, on the other hand, it is to mean only the recognition of the Union to the extent of collective dealing as to wage rates and other fair conditions, a principle of which the equity is conceded in modern industrialism, an agreement may easily be arrived at.

The outlook now is not threatening. It is understood—we believe correctly—that Mr. Mitchell does not want a strike, and he can probably command the support of a majority of the miners. Much depends on the manner in which the negotiations are conducted. While there is no formal organization of the anthracite operators, there is really a more compact union among them than can be found anywhere else in this country—perhaps in the world. The anthracite companies can—and will—act as a unit. If they act wisely, we believe that there will be a peaceable settlement in the anthracite region.

Novel Propositions in California.

Mr. A. Tregidgo, the newly elected president of the California Miners' Association, in announcing the policy he proposes to carry out for the benefit of the mountain counties of the State, has two propositions of rather a startling nature. One is to secure the investment of some of the surplus capital of New York and other Eastern financial centers in California mining operations; and the other is to work hydraulic mining ground without hydraulicking it. If the association never before had any hard jobs to accomplish, it will certainly have them now, if serious attempts are made to carry out the policy of the new president.

"Down on the plains and on the Feather and Yuba rivers," says Mr. Tregidgo, "they have a system of mining, where they get 17 cents a cubic yard out of their gravel. They have no dump, and no fall to reduce the cost of removing the worked-out material. They must pile it up. Here in the mountains we have a chance to take $7 a cubic yard out of the gravel. We have plenty of fall to store the worked material. Why cannot we level off the upper soil from these diggings with steam shovels and heap it on the sides, instead of running it into the cañons. Instead of turning a stream of water against the hillsides, we utilize that water in a far more economical way, to produce the electric power that we need, and we use that power. We remove the top soil and get down to the rock that contains millions of dollars in gold, which we must get at by the system now in use on the lower Yuba and on the Feather, but at far less cost, owing to our advantages, and we get dollars where they get cents.

"Times change, and men change with them, or get left in the procession of progress. New methods are now to the front. We must adopt them. The new process replaces the hydraulic method and enables us to work these great deposits on a far more economical basis than when we used to waste the water. We utilize the water now and get all that is in it.

"In New York last year there was distributed in dividends $160,000,000; all that money is for speculative purposes, and no one can tell me that it will not come this way, where the gold is known to be locked up in the earth, but easily available to capital. Then, too, the balance of trade is in favor of the United States, and we have all kinds of money in our financial centers, every dollar of which is looking for investment."

Removing the top dirt from hydraulic banks one or two hundred feet deep, by steam shovels, and taking out the rich bottom gravel by dredging, is a novel proposition, to say the least, and a bold one. It is hardly to be expected that any practical dredge men will ever attempt it. Some hydraulic miner must take the initiative and prove the feasibility of the plan before any capitalists would be willing to take chances. In high banks the cost of removing all but 30 or 40 feet might be more than the miners would get from the rich stratum on bedrock; and on hard, uneven bedrock dredgers cannot operate. The mining dredge has its limitations in many ways, and nobody has yet attempted to set it at work in hydraulic mining ground, of which there is plenty available.

As to capital for mining, individuals have been trying systematically to get it from Eastern points for the last 50 years, with comparatively small success, unless the merits of the schemes proposed have been well demonstrated. How an association of miners can get it on general principles without specific objects remains to be seen. It looks a harder job than dredging hydraulic ground.

British Columbia Mining Law.

The Supreme Court of Canada has rendered a decision in a mining appeal from the British Columbia courts which will have far-reaching effects in the methods of locating mining claims in that province. The decision was made in the matter of Docksteader vs. Clark, which had been before the British Columbia courts for several years, and by consent the judgment covers thirteen other cases, analogous to that which was tried. The point involved in all these cases was the correct interpretation of the provincial mining law regarding the location of mineral claims. The Mineral Act, 1896, Ch. 34, Sec. 15, specifies that a mineral claim where possible may measure 1,500 ft. in length by 1,500 ft. in breadth "in as nearly as possible rectangular form; that is to say, all angles shall be right angles, except in cases where a boundary line of a previously surveyed claim is adopted as common to both claims, but the lines need not necessarily be meridional. In defining the size of a mineral claim, it shall be measured horizontally, irrespective of inequalities of the surface of the ground." Section 16 relates to location posts and specifies that " a mineral claim shall be marked by two legal posts, placed as near as possible on the line of the ledge or vein and the posts shall be numbered 1 and 2, and the distance between posts 1 and 2 shall not exceed 1,500 feet."

The looseness in the language of this Act has given rise to a large amount of litigation, and led to considerable confusion and insecurity of tenure. The Docksteader vs. Clark appeal to the Supreme Court was consequently followed with much interest in mining circles in Western Canada. The court ruled:

(1) That 70° is too great a variation (from a right angle) to allow as an approximation, though no exact limit is fixed.

(2) A location may be wholly on one side of a location line.

(3) A location may traverse any number of claims.

(4) A discovery post may be even located on a Crown-granted (patented) claim.

This sweeping ruling will make confusion worse confounded. It is evident the Court clearly recognized the bad drafting of the Act and framed its decision so as to exhibit fully the latitude given to prospectors in locating new claims. The precedents set by the ruling greatly extend this latitude. According to this ruling, any number of prospectors can now go upon a developed mining property and drive posts locating claims in all directions. Although this may not disturb the title of patented, or alienated, ground, it will certainly inconvenience mine-owners and will be fruitful in litigation. The effect of the two last clauses of the ruling on the location of claims in a new mining district will be to cause endless trouble. It is likely to act as a premium on claim-jumping.

The Government of British Columbia has always recognized the value of the mining industries. It will now, doubtless, quickly recognize the anomalous features of the law relating to the location of mineral claims as it is left by the Supreme Court's ruling, and will lose no time in amending it so as specifically to define a prospector's rights in securing mineral land. The ruling of the Court in the case under review practically decides that the prospector has the utmost latitude in choosing his ground, and in interpreting the mining law the principle that technicalities shall not prevail holds good. This, however, is not sound practice, as it is too great an incentive to litigation. Experience the world over demonstrates the fact that statutes relating to land titles cannot be too specific.

Amortization in Industrial Plants.

A few years ago the Reclamation Service of the United States Geological Survey, which required a large quantity of cement for the construction of a dam in Arizona, was unable to obtain any bid at a satisfactory figure. Comparing with the lowest, it was reckoned that it would be cheaper to erect a cement plant near the work, raw materials for cement manufacture being available, and abandon the plant after the supply required for the job had been produced. Without going into the details of this particular case, we mention it as a clear illustration of the fundamental principle of the amortization, or writing off, of the capital invested in an industrial plant. This principle is simply that the plant is a means for effecting certain work. The artisan in purchasing a new tool required for some specific contract, for which he can foresee no subsequent use and where he doubts his ability to resell it, charges its cost against the contract. The great industrial plant is an aggregation of tools and appliances, the cost of which in a successful business must ultimately be defrayed out of the gross profits of the work performed with them. Not until such a deduction has been made can the net profit be truly computed.

The same principle enters into the consideration of both mining and metallurgical profits. Its method of treatment is also broadly the same, but in detail varies, or should vary, according to the difference in conditions. The mine is a deposit of profitable mineral, which ultimately is exhausted, perhaps totally; perhaps to the point where it ceases to be profitable. When either result is reached, the mining plant ceases to have value. Its cost must have been previously reimbursed, or the mine will have been unprofitable, although dividends may have been paid. The proper method of writing off original and subsequent construction accounts in mining is a subject which has frequently been discussed in this JOURNAL. It is unlikely, however, that any thoroughly scientific and equitable system can be determined except in the cases of ore deposits which have been practically delimited, and those are by far the less common in mining experience. Rules that a certain relation between ore reserves and treatment capacity should be observed can be deduced, nevertheless; and it is a matter of common prudence that no treatment plant should be erected until a sufficient tonnage of ore has been actually developed to warrant the investment, the precise ratio that is safe being dependent upon the prospective value of the mine in addition to its measured value. Failure to exercise this prudence has been one of the most prolific causes of loss in mining.

The case of a general metallurgical works, or other manufacturing plant, is different, inasmuch as it is not usually dependent upon a single exhaustible supply of material. Such a plant may, however, be erected under peculiar conditions that enable a certain period of usefulness to be forecast with sufficient accuracy for commercial purposes, in which event the computation of its amortization is comparatively simple. More often a plant is erected for the purpose of a business which is expected to continue for many years. The matter of amortization then becomes more difficult, but whatever be its difficulties a charge on that account is an element which must be considered in the cost of production. An industrial business, in order to be successful, must not only show a profit in operation, but also a profit large enough to return a reasonable percentage on the investment, besides redeeming the outlay in plant within a reasonable period. It is the practice of many engineers, in preliminary estimates, to reckon an amortization period of 10 years. On that basis, in a plant costing $2.50 per ton of annual capacity, 25 cents must be charged on each ton of ore treated in the works.

In reckoning an amortization period of 10 years, for example, it is not contemplated that such a time will represent the life of the business, nor even that the plant will become worn out and useless at the end of that time, but an intelligent management will be continually discarding portions of the plant, although physically in good condition, and replacing them by something better; and ordinarily such improvements ought to be made out of a reserve fund accumulated as an amortization account, or whatever the management may choose to call it. Almost all of the important industrial companies maintain such an account in one form or another. It is, however, a common (and well based) criticism that they seldom write off sufficient for this purpose. The method of writing off such an account is variable. That of the engineer in reckoning a percentage of the cost of the plant is simple and useful in preliminary estimates, but it becomes complicated after the plant has gone into operation. A common method, then, is to write off a percentage of the gross profits, which is done usually in an arbitrary manner, without proper consideration of the various ratios and conditions. It is a subject of great importance in all industrial enterprises, large and small, including metallurgical undertakings, which are frequently complicated by special and interesting conditions.

Metallics.

The weight of the stamps used on the Rand is 1,050 lb. on the average. They crush about 4.8 tons per stamp per day to pass a screen with 700 holes to the square inch.

In blende roasting it is generally safe to reckon that a well designed mechanical furnace will burn ore containing 30% sulphur down to a tenor of 1% sulphur at the rate of 20 lb. per square foot of hearth per 24 hours.

According to a report of the government mine inspector, the first cost of a 3¼-in. drill with bar on the Witwatersrand is $185. With drills working two shifts per day the cost of drill repairs is $300 per drill per year.

A French engineer has made the statement that as much as 59% of the total heat developed in a steam engine goes to the condenser. When the engine is operating on free exhaust 64.6% of the heat is dissipated in the atmosphere.

Micanite, or "mica board," is made by building up layer after layer of the thinnest mica films. A coating of special cement or adhesive containing shellac is placed between the layers and the whole is subjected to hydraulic pressure.

The cost of gold dredging in California varies from 2.36 to 8.5c. per cu. yd. Figures of 3c. or less are reported for new dredges in which advantage has been taken of all the latest ideas as to strengthening the parts of the machinery, with resulting diminution of breakdowns and consequently less cost for repairs.

Serious damage is sometimes done to boiler plates by the careless or ignorant use of caulking tools; a nick in the plate along the caulking edge made by a sharp-nosed tool may prove the starting point of a serious break. Round-nosed tools are now more generally used for caulking and are much less likely to injure the plate.

Scrap mica for grinding is worth $8 to $10 per ton. It must be free from rust or gangue, which would affect both the color and luster of the product. Ground mica varies from 20 to 200 mesh in size, according to the purpose for which required. It is worth from 5 to 10c. per lb. Old fashioned buhrstones are commonly employed in the grinding process.

The effect of vanadium upon steel has been shown by melting a specimen of mild steel, free from phosphorus, in a graphite crucible. The steel originally had a tensile strength of 30 tons per sq. in., and an elongation of 17%. After melting, it became carbonized and showed 61 tons tensile strength and 23% elongation. The addition of 1% of vanadium raised the tensile strength to 69 tons, and the elongation to 7.3 per cent.

The cost of a modern heavy type stamp mill, erected on the Rand, is roughly £310 per stamp for a 100-stamp mill. The indicated horse-power required to operate such a mill is about 3 h. p. per stamp. If the stamps are placed back to back, four white men and four blacks per shift are required to work the mill (100 stamps). If the stamps be placed in one line two whites and two blacks per shift can care properly for 60 stamps.

Sulphide ores suffer a loss of weight in roasting which is generally proportional to the content of sulphur, because oxygen (which is an element of lower atomic weight) is substituted for the sulphur. In so far as the sulphides are converted into sulphates, however, there is an increase in weight, sulphates being formed to more or less extent. The actual loss of weight in any case can be determined only by experiment, although a close approximation can be made by computation.

Chromates can be prepared from chromic iron ore by the use of sodium- (instead of potassium-) hydroxide, provided an oxidizer (such as a manganate, cupric oxide, litharge or sesquioxide of iron, etc.) be present. For example, if 50 kg. of finely ground chromite is heated to 500 or 600° C., with 75 kg. of caustic soda and 5 kg. of pyrolusite, with constant stirring in a current of air, in a short time 95% of the chromium will be oxidized into sodium chromate.

Gasoline air-compressors may often be employed advantageously in work that does not warrant the installation of a steam plant. A 3¼-in. drill will require about 12 h.p., or 12 pints (1.5 gal.) of gasoline, which, at price of 15c. per gal., would make the operation for eight hours come to $1.20, reckoning that the drill is run two-thirds time. There may be also saving in attendance, as compared with a small steam plant. Gasoline air-compressors have been successfully employed in mining work.

A blast-furnace, 17 m. high, at Donnersmarckhütte, Upper Silesia, was put into operation for the manufacture of ferrosilicon, using some iron ore rather high in zinc. The temperature of the furnace was considerably higher than for the manufacture of pig iron. On the second day, at a point about two-thirds up the shaft, in a zone several meters broad, metallic zinc began to creep through. In a single day 100 kg. of zinc was removed from the furnace at this place. The zinc was of high grade, containing only 0.277% lead and 0.013% iron.

Both at Oroville and Folsom, Cal., it has been found that gold (even the finest) if brought in contact with quicksilver will amalgamate without much difficulty. In Colorado and Idaho, where there is fine gold, and dredging has been done on rather an extensive scale, it has been found impossible to make an efficient saving of gold with quicksilver, owing to the presence of arsenic or something else. Consequently, cocoa matting or some similar appliance must be used. When fine gold will amalgamate freely, riffles and quicksilver are preferable to cocoa matting.

In dredging practice in California, the crew of a dredge usually comprises one foreman, at $5 per day; three winchmen, at $3@$3.50; three oilers, at $2.@$2.50; one blacksmith, at $3.50; one helper. at $2 @$2.50; and two Chinamen, at $1.75@ $2.50. The total labor cost per day is $29 @$34. This is at the rate of wages usually paid at Oroville. In addition there is a superintendent, whose time is generally divided among several dredges. The winchmen and oilers work eight-hour shifts, while the blacksmith and helper work 10 hours. The Chinamen clear the ground of brush and trees, bury "dead men," as making fasteners for the lines is called, and do general chores.

Experience has shown in mica mining, that in a property that can be worked by quarrying there must be a yield of at least 750 lb. of thumb-trimmed mica for every 100 tons of rock in order to afford a profit. In underground mining a yield of at least 1,250 lb. of thumb-trimmed mica per 100 tons of rock hoisted must be obtained. The proportion of run-of-mine product is very much larger, sometimes 20 times as much. In a good paying mine, however, the run-of-mine should not be more than eight to ten times the quality of trimmed mica. This is to say, in quarry work 100 tons of rock should yield about three tons of produst, affording 750 lb. of thumb-trimmed mica, and in underground mining about five tons of product, affording 1,250 lb. Generally speaking, these figures represent the experience of mica mines in the Province of Quebec.

In the zinc retort, 1 kg. of zinc in the charge produces about 172 liters of zinc vapor. In using 0.2 kg. of carbon for reduction of the oxide, there is produced 342 liters of carbon monoxide, wherefore the relative volumes of the zinc vapor and carbon monoxide are 1 : 2. For the smelting and reduction of the ore in the blast-furnace, with an estimated utilization of 60% of the calories of the carbon, 1 kg. of zinc would require 0.6 kg. of carbon, which in burning to monoxide would require 2,700 liters of air and would produce 3,264 liters of combustion products (carbon monoxide and nitrogen). The ratio of zinc vapor to combustion products would be therefore 1 : 19. These figures have been computed by Fr. Kellermann. In practice the percentage of zinc vapor discharged by the blast-furnace would really be smaller. This great dilution of the gas is one of the obstacles to success in attempts to smelt zinc ore in the blast-furnace.

Colliery Notes.

A ton of water (240 gal.) is the usual estimated quantity required to wash a ton of coal.

A bushel of bituminous coal is different in different States. In Illinois, Iowa, Missouri and Kentucky its weight is 80 lb.; in Pennsylvania, 76 lb.; and in Indiana, 70 pounds.

In testing ropes of hard steel wire, tensile strength is of less importance than ductility and elasticity, since the metal of high ultimate strength is usually deficient in elongation; it has a low elastic limit.

Tests of the strength of wire rope, conducted for the French government, show that the ultimate strength of a round rope is 33% less than the sum of the tensile strengths of its individual wires before being laid.

Cannel coal is frequently used for foundry facings, and by some founders is preferred to the Youghiogheny. Its composition is as follows: Moisture, 3.30%; volatile matter, 48.50%; fixed carbon, 42%; sulphur, 0.20%; ash, 6%.

Most of the blasting powder now manufactured contains sodium nitrate (Chile saltpeter), and on that account deteriorates in time by absorbing moisture from the atmosphere. For this reason, great care must be taken to keep it dry, and it should be used very soon after it is received from the factory.

Careful evaporative tests with North Dakota lignite have been made. These experiments (undertaken at the Asylum for the Insane at Jamestown, at the Missouri Valley Milling Co. at Mandan, at the Fargo Edison Electric Co. at Fargo, at the State University, at Grand Forks, and at the State Agricultural College at Fargo), plainly show that 1 lb. of lignite will evaporate 4.1 lb. of water under ordinary boilers.

A new industry, incidental to the anthracite trade, is rapidly developing; it is that of the cutting and polishing of water crystals found in the mines. They are becoming a great fad, and in many instances the ordinary man cannot detect the difference between them and the real diamond. Miners are now offered inducements to preserve the best finds instead of throwing them away as heretofore. Last week a Hazleton miner was given $100 for a slab.

Coal is found in commercial quantities and of good grade in many of the States along the west coast of Mexico, the Sonora outcrop promising particularly good results. The lignite deposits of Michoacan have not been exploited thus far, because of the lack of railroad transportation, but a company known as the Compañia Exploradora de Carbon has recently been organized to develop these fields. At present no coal deposits of commercial importance are in active exploitation along the Pacific coast of the Republic, the only State in which coal is regularly mined being Coahuila.

A hoisting rope shows the greatest wear at the upper end of its running length, regardless of the depth of shaft. In the case of modern deep shafts hoisting heavy loads at high speeds, this unequal wear is due to the preponderating live weight of the rope itself. This does not apply, however, to ropes used for hoisting from varying depths, where the lower portion may be used for long periods and the upper end not even unwound. The care now experienced in cutting out and re-inserting the shaft end of hoisting ropes, in their clevises, as well as the more perfect construction of shaft guides and safety catches, has largely removed the danger of breakage at the traveling ends of ropes.

The most significant topics for a discussion on the wear of wire hosting ropes are: (*a*) Relation of drum and sheave diameters to diameter of rope. (*b*) Method of attachment of rope to drum. (*c*) Crushing effect on underlaps on a drum having numerous layers of rope wound on it. (*d*) Best angle of inclination from drum to head sheave. (*e*) Weight, dimensions and design of sheaves and rollers; the disadvantage of too much load on a sheave, and of a sheave so heavy that the hoisting rope has to act upon it as a brake in overcoming rotative momentum. (*f*) Method of attachment of rope to skip or cage. (*g*) Rope lubrication, with a prescription for a mixture that can be made on the spot. (*h*) Evidence and discernment of rope deterioration. (*i*) Effect of acidity in mine water. (*j*) The obviation or elimination of twisting or kinking of ropes.

A good blasting powder has a uniform dark gray or slaty color. A dead black, or a bluish color, indicates either too much charcoal, or the presence of moisture. When poured over a sheet of paper it should leave no dust, for dust indicates either the presence of moisture, or of fine mealy powder. The size of the grains should be uniform. They should have no sharp corners. On pressing between the fingers there should not be a crackling sound due to sharp grains; nor should the grains crush easily. Light colored spots in the powder when crushed show that saltpeter has leached out, which reduces the strength and reliability of the powder. If there are no light spots, however, although the power be slightly damp, it may be dried out in the sun and will then be as good as ever. A pinch of good powder ignited on a sheet of white paper burns away rapidly, leaving no residue. If black spots remain on the paper, they show an excess of charcoal, or poor mixture of the ingredients. Yellow spots indicate an excess of sulphur. If holes are burned in the paper they indicate an excess of moisture, or some other imperfection.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Chinese in the Transvaal.

Sir—In a recent issue of this JOURNAL (Nov. 11, 1905, p. 876), A. Selwyn-Brown writes a forcible article on the "Chinese question in the Transvaal." In the first paragraphs of his article Mr. Brown deals at some length with Chinese labor, and in the latter part he touches on the economic practices of the Transvaal generally. Having resided for a number of years in the Transvaal, and having also visited the goldfields of Western Australia (which Mr. Brown compares with South Africa), I wish to point out some facts in his article which may be misleading.

The labor question (although the supply for the mines is not yet complete) has never been so satisfactory as it is at the present time. The number of Chinese employed each month shows a steady increase; as the compounds are re-arranged for their reception, more are imported, and in the course of the next few months the complement for present needs will be sufficient. From all the recent reports, the Chinaman has proved himself a satisfactory substitute for the Kaffir as a miner.

The Basuto Kaffir usually comes to the mines on a four months' contract; the first six weeks are consumed in instructing him in his work, when he then becomes a more or less efficient unskilled laborer. The Chinaman comes for three years; after a month he is as efficient as a Kaffir, who has been learning for six weeks, and he gives to the company which employs him about 33 months work, against the Basuito Kaffir's useful period of 11 weeks. Taking a comparison between the work done by the Chinaman and the Kaffir in drilling a 1-in. hole, recent returns show that the average drilled per shift by the Chinaman is 40 in., against an average of rather less than 30 in. by the Kaffir.

The imposed confinement in compounds, as referred to, is not quite correct in the actual conditions; any Chinaman can get permission to visit his friends and he may be away from the compound for 48 hours; this can scarcely be termed strict confinement in the compound; all Chinamen are allowed to roam within the limits of the mining properties, which, in some cases, comprise 600 acres.

Mr. Brown describes the Chinese as more wily than the Kaffir. The word "wily" would better read "intelligent," the concensus of opinion declares him to be more industrious. As to the statement

that the Chinaman has not the physical strength of the Kaffir, the Chinaman does more work than the Kaffir; if his physical strength is not as great as that of the Kaffir, what he lacks in physique he makes up in industry.

As to the statement that their strength is physically overtaxed and they are inclined to rebel, the health returns of the Chinese in the Transvaal do not point, in any degree, to their physical strength being overtaxed. The death rate for the 12 months, ending Aug. 31, 1905, for all causes, is, 19.507 per thousand per annum. Comparing this with the native figures (which are 44.299 per thousand per annum), it will be seen that the death rate of the Chinaman is considerably less than that of the Kaffir.

As far as desertions are concerned, J. W. Jameson, the superintendent of the Foreign Labor Department, gives his opinion (*Transvaal Government Gazette*, Oct. 6) that it is not through dislike to the work, but for other causes generally that the Chinaman deserts.

Crime among the Chinese is comparatively rare; in the greater number of cases the convictions obtained are against the by-laws of the Labor Importation Ordinance. For the year ending June, 1905, the following is a list of the convictions in the Transvaal: Whites, 8,261; Kaffirs, 21,-242; Asiatics other than Chinese, 524; colored persons, 1,179; Chinese, 2,156; of which 1,540 were convicted for transgressions of the by-laws of the Labor Importation Ordinance. Before the war, charges against natives were more numerous per capita than is now the case against the Chinese. It is to be expected that, in collecting together 50,000 Chinese, some bad characters will be included, but these are being weeded out and deported. The recent decrease in crime among the Chinese is noticeable; and does not exceed that in many other mining camps.

In the Transvaal there has always been a continuous request for arms; in the pre-war days, by the Uitlanders to the government of the South African Republic; and in later years, by the Boers to the Transvaal Government. But, as the cry for arms subsided practically after the war (when the Boers wanted to protect themselves against phantom Kaffir attacks), so will the cry now die down as the inhabitants find that the government is not willing to allow a general re-armament.

As to the public demand for the immediate repatriation of the Chinese, there is little or none of this. Discordant voices of a few individuals are heard at times, but the majority wish to see a continuance of the prosperous era which has now set in, and which is due in great part to the importation of the Chinese. Recent trade returns point to a good financial and economic condition, as the following figures show:

TRANSVAAL EXPORTS.

Six months ending June 30th, 1905.	Six months ending June 30th, 1904.
£11,305,979	£8,406,247

IMPORTS.

Six months ending June 30th, 1905.	Six months ending June 30th, 1904.
£7,628,984	£6,842,040

It is true there was a backthrow in the progress of the country for some years, due to the war and the three years of the gradual upbuilding of the industry; but now the country finds itself not only in as healthy and prosperous a condition as before the war, but even in a more healthy state. All this is due in no small part to the increased suply of unskilled labor.

Mr. Brown also touches on an economic comparison between the Rand and Kalgoorlie. From a mining point of view the comparison is hardly fair. The Rand is essentially a mining proposition with small reefs, and demanding that the stopes be worked with hand drills; the nature of the hanging wall and the condition of the reef, debar the use of machine drills for economic mining. On the Rand, metallurgical treatment is comparatively simple. At Kalgoorlie, huge bodies of high-grade ore are found eminently adapted for the use of rock drills in all the stopes, but the extraction of gold is hampered by difficult extraction processes.

Regarding the speech of the chairman of the Hainult Gold Mining Co., at its recent annual general meeting, I cannot agree with these remarks. With the same labor conditions and with the same management as that in vogue on the Rand, many of the unpayable propositions in Australia would return a handsome profit.

ARTHUR E. PETTIT.

Consulting engineer, in London, to the Consolidated Gold Fields of South Africa, Ltd.

London, Nov. 22, 1905.

The Mines of Rhodesia.

Sir—Mr. Curle's article and your editorial on "The Mines of Rhodesia," published in your JOURNAL of Nov. 4, are hardly commendatory of the values of that district. In view of the extensive advertisement that Rhodesia has received as to its past, present and future wealth, and the wide and extensive developments and investments made, such strong comments and illustrations of the present conditions seem much at variance, and one is inclined to think that someone has blundered in his estimate of the values. To many people it must have been evident, for a long time, that Rhodesia is not a great nor a permanent mining district.

No less an authority than H. C. Perkins visited and examined the district in 1893 or 1894, on behalf of the Consolidated Gold Fields of South Africa, and I think I am quite correct in quoting him as having said that the reefs of Rhodesia have no great continuity laterally and less continuity in depth, and that the best of them would be of value only to small syndicates. I believe that this value was greatly depreciated by the rules and royalties demanded by the Chartered Company. Hence it would seem that the opinions of Mr. Perkins and of Mr. Curle are identical, notwithstanding that one was expressed before development had commenced on any large scale, and the other eleven years later and after large sums had been spent in developing all parts of the district.

Outside of the 400,000 odd acres comprising the Rand conglomerates there is no known gold field of any magnitude in South Africa; here and there are found paying properties, but they are quite isolated.

C. S. RICHARDSON.

Paris, France, Nov. 14, 1905.

Nomenclature of Zinc Ores.

Sir—I notice in a recent number of the JOURNAL that an effort is being made by Dr. E. R. Buckley, through the American Mining Congress, to straighten out the nomenclature of zinc ores. I think everyone who has had occasion to work in this field will wish hearty success to the movement. In this connection I would especially urge the necessity of having more scientific direction in the customs service. I was very much struck this summer with the fact that the amount of zinc ore reported as imported did not tally with that which I knew was being used in this country, and so I made a special visit to one of the customs houses to find out why this was. One interesting thing brought out was the fact that, under orders from Washington, "calamine" was being classified among medicines, and as calamine included zinc carbonate coming in by carload lots, it showed a startling increase in the importation of medicines, whereas the imports of ore were rather meager. As the matter stands now, it is practically impossible to find out how much zinc ore is coming into this country, and, whatever may be the right and the wrong of tariff on ore, we should at least know exactly what is coming in, so as to know what would be fair to do.

H. FOSTER BAIN,

Director State Geological Survey.

Urbana, Ill., Dec. 8, 1905.

[The customs classification of calamine criticised by our correspondent is, of course, pure stupidity.—ED.]

The annual coinage by the United States Mint of 5c. pieces, from an alloy of 75% copper and 25% nickel is for the 21 years between 1883 and 1903, 335,528,399 in number, or 15,977,543 per year. In the last five years the nickel coinage by the United States Mint has been as follows: 1899, 26,029,031; 1900, 27,255,995; 1901, 26,480,-213; 1902, 31,480,579; in 1903, 28,006,725.

New Publications.

Economic Geology of the United States. By Heinrich Ries. Pages, 400; illustrated. 6 by 8 in. Cloth. $2.00. New New York, 1905: The Macmillan Co.; London: Macmillan & Company.

This book is intended to be a text-book for colleges; it is the equivalent of the course in Cornell University. The first part treats of non-metallic minerals; taking up in succession coal, the hydrocarbons, building stones, clays, lime and cements, salines, fertilizers, the minor minerals, soils and water. The second part treats of metallic minerals or ores; it opens with a general chapter on ore deposits; then it considers in succession iron, copper, lead and zinc, gold and silver, silver-lead and the minor metals.

Dr. Ries says that his arrangement of matter differs from that of most books on the subject. The non-metallic minerals are put first, partly because they are economically of the greater value; but chiefly because this order leads logically from the discussion of the simpler forms of mineral deposits to that of the more complex.

While the book is for students, it assumes that they have at least an elementary knowledge of geology, and therefore no chapter on geologic principles has been included. At the close of the chapter a list of references to books and papers is given, which will be of use to the student who wants to extend his reading.

From the previous work and experience of Dr. Ries as geologist and teacher, it was to be expected that he would make an excellent text-book. In this case he has also made one which will interest the student and attract him to extended investigation of the subject.

The Honorable Peter White, a Biographical Sketch of the Lake Superior Iron Country. By Ralph D. Williams. 208 pages; illustrated. 8 by 9 in. Cloth, $1.50. Cleveland, O., 1905: The Penton Publishing Co.

The sub-title of this book is excellently chosen; for no history of the Lake Superior iron country could be written which did not have much to say about Peter White; and no life of Peter White could be written which was not also in large degree a history of the iron country; Peter White has been in it, and of it; he has taken part in its progress from the time when—nearly 60 years ago—he helped to open the first iron mine, from the day when he wrote the bill of lading for the first shipment of iron ore; down to the present time, when he is universally regarded as the first citizen of the iron country. It is a position accorded to him, but not claimed by him; for his inclination has been to keep himself in the background, though he has always been on hand when there was work to be done for the development of the iron country or for the advancement of its interests.

At the present day, when the yearly shipments from the Marquette and Menominee ranges run up into millions of tons, and when the possession of some of these mines means the most valuable asset of huge corporations, we can hardly realize the toil and privations undergone by the few pioneers who opened the old Jackson mine, and built the Carp River forge back in the '40's. They had faith, and not much else. Their only communication with the outside world was by a few little schooners, which were forced to trans-ship all their freight around the Sault, and which were altogether unfitted to cope with the frequent storms of Lake Superior. Moreover, the pioneers had little backing from outside.

Today over 75% of our pig iron is made from Lake ores; but, when the first shipments were sent out, the furnace-men of Pennsylvania and Ohio looked at the ore doubtfully. Many of them pronounced it worthless, and refused to handle it. Even those who were willing to try it, experimented for some time before they could use it to advantage. The first iron made with it in the old Sharpsville furnace was returned by the buyer as being "no good."

Though it is only 50 years since ores began to be regularly delivered at Cleveland, yet there is already a controversy as to the man who first succeeded in making good iron with it; at best the honor seems to be divided among two or three of the old iron-masters.

As a boy, Peter White was with the first party which went to Carp river, and afterward made the first beginning of the town which has since become the flourishing city of Marquette. A laborer at first, his hard work and force of character, in time, brought him to the front, and he became a prominent member of the community. He built the tramway which superseded the teams that hauled the ore from the mines to the docks; this in its turn was superseded by a steam railroad. Mr. White was largely instrumental in securing the grant which made possible the building of the first locks at the Sault Ste. Marie. He took a prominent part in every new work which could help the iron country and his chosen town of Marquette.

When, last August, the semi-centennial of the completion of the first canal at the Sault was celebrated, Peter White was the unanimous choice for the historian of the day. Mr. White and Charles T. Harvey (the engineer of the canal of that name) were the honored guests of that occasion.

All these things Mr. Williams has told well in his book, with many interesting details of the history of the Lake country. This book has been handsomely printed by the publishers, and has many excellent illustrations, a number of them of much historic value. It is a book well worth reading by all who are in any way interested in the Lake country and its history—and that means a great many of us.

Peter White is still living, 77 years old, but hale and hearty, and the friend of all who know him. He is not a rich man as riches are counted nowadays, but he is able to take the ease and comfort he has so well earned. And to him has been given, more than to most men, to see the fruit of his early labors.

Professional Papers.

Electricity in Continental Mines. By C. Smith. *Mines and Minerals,* Dec., 1905, pp. 200-203, illustrated. Description of some German hoisting plants possessing interesting features.

Modern Methods in Shaft Sinking. By James Tongo. *Mines and Minerals.* Dec., 1905, pp. 225-227, illustrated. Description of a number of improvements in sinking circular shafts in Great Britain.

The Aerial Rail Hoist and Haulage System. By W. R. Crane. *Mines and Minerals,* Dec., 1905, pp. 193-195, illustrated. Description of a system of mono-rail transportation evolved in the Joplin district.

Thermite Practice in America. By E. Stütz. *Journal* of the Franklin Institute, CLX, 6, Dec., 1905, pp. 435-454, illustrated. General description of the process and its recent applications in this country.

Gold Dredging. By J. W. H. Piper. *Journal* of the Transvaal Institute of Mechanical Engineers, IV, 2, Sept., 1905. Description of the mechanism and working methods of New Zealand gold dredges.

Resena del Mineral de Arzate, Durango Mex. By Juan D. Villarello. *Boletin* de la Secretaria de Fomento, Nov., 1905, pp. 301-312; and to be continued. Description of the geology, mines and ore deposits of the district.

Die Bleiglanzlagerstätten von Mazarron in Spanien. By Richard Pilz. *Zeitschrift für Praktische Geologie,* Nov., 1905, pp. 385-409. A study of the geology and the mineral veins of the district and a discussion of the ore deposition.

Electrolytic Copper. By Lawrence Addicks. *Journal* of the Franklin Institute, CLX, 6, Dec., 1905, pp. 421-433. Theoretical and technical treatment of electrolytic copper refining, with particular reference to the multiple system of circuit arrangement.

Informe Sobre los Yacimientos Auriferos de Sandia, Peru. By Luis Pflücker. *Boletin* No. 26 del Cuerpo de Ingenieros de Minas del Peru, with illustrations and map; pp. 40. Notes on the geology and mining operations in this hydraulic gold-mining district of Peru.

The Ontario Mining Conference.

The conference of mining men summoned by the Provincial Government of Ontario to make suggestions in regard to the revision of the mining laws met at the Parliament building, Toronto, Dec. 12. There were about 120 delegates in attendance. W. D. McPherson, of Toronto, was elected chairman, and Fred A. Fenton, of Toronto, secretary. After much discussion as to procedure, the following committee on resolutions was appointed: R. McConnell and G. G. Glendenning, Haileybury; J. F. Black and J. R. Gordon, Sudbury; W. Hungerford and Joseph James, Hastings district; A. J. Young and John Ferguson, North Bay; J. Lorne McDougall and H. H. Lang, Ottawa; T. B. Caldwell and G. Y. Chown, Kingston; Geo. Marks and P. McKellar, Port Arthur; R. H. Flaherty, Kenora; A. C. Boyce and John Mackay, Sault Ste. Marie; W. D. Gregory and W. G. Tretheway, Toronto; J. G. Barnet, Renfrew; J. Stobie, Bruce Mines; J. S. Wilson, Massey; R. R. Gamey, M. P. P., Manitoulin; Prof. A. B. Willmott, Michipicoten; A. Ferland, Mattawa; B. A. C. Caldwell, Temagami, and D. G. Keer, Cordova.

Hon. Frank Cochrane, Minister of Lands and Mines, made a brief address, reminding the conference that the government had to legislate for the whole people and they should therefore avoid asking too much. There had been rumors about favored parties having a pull at Cobalt, but he wanted to say, "pull is dead and he is not going to be resurrected." He hoped the meeting would come to definite conclusions as to what they wanted, as in his opinion the best mining law was a law that remained unchanged.

The conference was also addressed by G. B. Smith, of Thetford Mines, Quebec, president of the Canadian Mining Institute, and H. Mortimer Lamb, of Montreal.

A resolution that it would be injudicious to provide for payment of any royalty or for a special tax applicable to the mining industry was discussed at length; and was finally adopted, only two delegates voting against it.

The following resolutions were unanimously adopted:

That there should be only one mining law for the whole of the province.

That all lands belonging to the Crown, whether surveyed or unsurveyed and whether valuable for timber or not, should at all times be open for exploration and sale, and that no lands should at any time or under any circumstances be withdrawn from exploration or sale by Order-in-Council or otherwise, and that when any discovery of mineral is made on a timber limit, valuable for pine, sufficient to warrant mining operations, a location title be isued to the discoverer, so that he may have a negotiable interest in his discovery, and that after such location the owner of the timber berth be given a limited time—not to exceed three years—in which to remove the pine, after which date the ownership to the mineral discovery shall be absolute, subject only to the working conditions under the mining act.

A resolution was also adopted to the effect that New Ontario and other mining sections should be formed into recording districts, with a recording office in each, where all applications for locations should be made.

F. J. S. Martin, G. Y. Chown, J. A. Proctor, Geo. May and A. E. Brown were appointed a Committee on Provincial Organization. They reported in favor of the formation of an association to be known as the Ontario Mining Asociation, open to residents of Ontario and non-residents interested in provincial mines. The report was adopted.

On Dec. 13, George Marks, chairman of the Committee on Resolutions, reported that a deadlock had occurred in the committee over a resolution proposed, "that any licensee may stake out a location without first making a discovery of mineral thereon." The discussion which followed was characterized by considerable feeling, and strong antagonism between the prospectors and the mining men and investors was apparent. Finally it was decided to consider the resolution in open meeting, dispensing with a report from the committee. Several amendments were moved and the debate lasted nearly all day. Eventually a compromise resolution was adopted amending the original resolution as follows: "That any licensee may stake out a location without first making a discovery of mineral thereon under stringent working conditions to be decided by this meeting." Among other resolutions adopted was one fixing the area of locations at 40 acres.

On Dec. 14, a resolution was passed specifying the working conditions under which locations should be allowed, to the effect that a licensee be required to spend $100 in actual mining work during the 90 days succeeding his application (excluding the six months from November to April), and a similar amount during three succeeding years, such expenditure to be computed at the rate of $3 per day for each day's work performed. It was also resolved that for every adjoining five locations held by one or more licensees and principally valuable for base metals, development operations might be carried out on one or more of the locations.

Other resolutions were adopted protesting against the system of paying bounties on pig iron smelted from foreign ores, and asking for its discontinuance; also that the bounty on pig iron made from domestic ores be placed at $3 per ton for the next five years; recommending that the price of mineral lands should be uniform at the rate of $2.50 per acre; that the province should erect a smelter and refinery for silver-cobalt ores, and make provision for treating and refining copper and nickel ore.

The conference came to a close on Dec. 15. It was decided not to form a provincial association, in view of the fact that the miners at different centers had decided on forming local organizations which might affiliate with the Canadian Mining Institute. Among numerous resolutions adopted were recommendations that the Government should offer prizes for the demonstration of satisfactory methods for the treatment of refractory ores, and that they should procure expert evidence as to the advisability of testing the Thunder Bay silver district. The resolutions adopted were presented to Hon. Frank Cochrane, who at the close addressed the conference, stating that their unanimous action would have great weight with the Government. He pointed out, however, the necessity of protecting the timber, one of the largest sources of revenue, and intimated that arrangements might be made by which at least a portion of the extensive Gillies timber limit, south of the Cobalt mining district, would be thrown open next spring to prospectors.

Questions and Answers.

Molybdenum in Smelting.

What is the effect in lead blast furnaces of molybdenum, the ore being molybdate of lead. Will the molybdenum go into the bullion, or the matte, or the slag, and in what proportions?

Answer.—In smelting an ore, such as wulfenite for example, in a lead furnace, most of the molybdenum will go into the slag (as a calcium molybdate for example), and very little, if any, will be found in the lead bullion. The molybdenum is essentially an acidiferous metal, and, in fusion, would follow the silica into the slag, uniting with such bases as gold appear in a free state? R. R.

Gold Tellurides.

Does tellurium occur combined chemically with gold? Are the "tellurides" found on the surface, or only with depth? When found on the surface, is a telluride changed in appearance by weathering? If an ore originally exists, say, as petzite, does it ever lose its distinctive character? If such a petzite decomposes, does the gold appear in a free state?

Answer.—Tellurium does occur combined with gold; this is one of the few cases where gold is known to occur chemically combined.

Tellurides are found as true vein minerals of gold, both in veins and also on the surface. When found at or near the surface and in the area of weathering, the tellurides (which naturally have a bright metallic luster when fresh) may be much decomposed; the tellurium may be oxidized to brown, or gray, earthy salts, as

tellurates of iron and the like. Thus petzite, calaverite, etc., well known tellurium minerals, may be changed entirely in appearance. Frequently the tellurium produced by decomposition, may form a black, "sooty" mass, and the residual gold (which in spongy form, may retain the shape of the original crystal of the respective telluride) may be left as so-called "rusty" gold. This rusty gold usually has a clean russet color, and may appear earthy; but it usually "burnishes" to the characteristic gold color by a little rubbing. It takes a practiced eye to detect "rusty" gold. Often the gold from decomposed tellurides may itself form nodules of the yellow metal that cannot fail of recognition, even by the "tenderfoot."

Abstracts of Official Reports.

The Republic Iron & Steel Company.

The report for the year ending June 30, 1905, shows net profits of $1,373,608, as compared with a net deficit of $254,187 in the operations of the previous year. In 1903-4, however, dividends amounting to $357,296 were distributed, while they were withheld in 1904-5, so that the surplus carried forward this year is larger by $611,483 than it was a year ago.

Gross sales in 1904-5 brought in $22,188,843, or $4,946,273 more than during the year before. For new construction $728,980 was spent, most of which went for the completion of the rail mill, the sheet and the tin bar mill at the Bessemer plant at Youngstown, Ohio. The rail mill went into operation in April, 1905, and now utilizes the steel product from the company's converters. Contracts for a blast-furnace plant have been let. The present bessemer plant made 405,000 tons of finished steel during the year.

The profit and loss accounts for the last two years show the following comparison:

	1903-4.	1904-5.
Gross profits over operating and new construction expenses, etc.	$1,306,068	$2,508,068
Reconstruction, renewals and repairs		$803,867
Interest		232,172
Discount and expense of bond issue		98,422
Total deductions	$1,560,256	$1,134,461
Net profits	$254,188	$1,373,607
Dividends	357,296	Nil
Surplus	$611,484	$1,373.607
Balance brought forward	2,027,238	2,636,722
Balance carried forward	$2,638,722	$4,010,329

Within the year, the financial arrangements of the company have been terminated, an issue of $10,000,000 of bonds having been placed. The collateral trust notes heretofore issued have largely been paid, and the remainder will be redeemed on or before maturity, in October, 1907.

The company's capital comprises $20,416,900 of preferred stock, of which $435,100 remains in the treasury, and $27,191,000 of common stock, of which $161,000 remains in the treasury.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Dec. 12, 1905.

806,774. PROCESS OF TREATING ORES.—Horace F. Brown, Oakland, Cal.

806,778. REVERSING-VALVE FOR FURNACES.—John H. Clewer, Kansas City, Mo.

806,781. LITTER-FRAME FOR PACK-SADDLES.—Henry W. Daly, Leavenworth, Kan.

806,788. METHOD OF AGING PORTLAND CEMENT.—William O. Emery, Crawfordsville, Ind.

806,835. ELECTROPLATING APPARATUS.—Louis Potthoff, Flushing, N. Y.

806,845. MANUFACTURE OF BRIQUET FUEL FROM COAL-MINE WASTE OR DUST-COAL.—Thomas Rouse and Herrmann Cohn, London, England.

806,857. WINDING OR HAULING APPARATUS FOR MINES AND THE LIKE.—Edwin G. Weldon, Johannesburg, Transvaal.

806,876. ARTIFICIAL-FUEL FORMING AND COMPRESSING MACHINE.—James M. Dennis, Richmond, Ind., assignor of one-half to William H. Alford, one-fourth to George E. Kemper, and one-fourth to George W. Deuker, Richmond, Ind.

806,886. PORTABLE DRILLING-MACHINE.—Harvey S. Glenn and Coulter E. Glenn, Oakmont, Pa.

806,894. CALCINING-FURNACE. — George N. Jeppson, Worcester, Mass.

806,900. GALVANIZING APPARATUS.—William A. Leonard, West Wareham, Mass., assignor of one-half to Tremont Nail Company, West Wareham, Mass., a corporation of Massachusetts.

806,945. PROCESS OF PREPARING AND FEEDING RE-AGENTS.—John F. Wixford, St. Louis, Mo.

806,946. PROCESS OF PREPARING AND FEEDING MILK OF LIME.—John F. Wixford, St. Louis, Mo.

807,008. PROCESS OF PURIFYING WATER.—John F. Wixford, St. Louis, Mo.

807,023. GOLD WASHING AND SEPARATING SCREEN.—Charles W. Gardner, Oroville, Cal.

807,026. PROCESS OF CONVERTING CAST-IRON INTO IRON OR STEEL.—Paul L. T. Heroult, La Praz, France, assignor to Societe Electro Metallurgique Francaise, Froges, Isere, France.

807,028. PROCESS OF OBTAINING SOUND INGOTS.—Paul L. T. Heroult, La Praz, France, assignor to Societe Electro Metallurgique Francaise, Froges, Isere, France.

807,056. CENTRIFUGAL SEPARATOR.—John J. Berrigan, East Orange, N. J., assignor to Francis J. Arend, New York, N. Y., and John Bernstrom, Stockholm, Sweden.

807,071. GAS-PRODUCER.—Bruno Graupe. Cologne-Deutz, Germany.

807,118. APPARATUS FOR DRAWING COKE-OVENS.—Isaac C. Kelly, Scottdale, Pa.

807,128. SHARPENING-MACHINE FOR DRILL-BITS.—Theodore H. Proske, Denver, Colo.

807,203. CHEMICAL CHART.—Charles D. Poore, Minneapolis, Minn.

807,226. BIN.—Edwin J. Walker, Jr., Philadelphia, Pa.

807,271. PROCESS OF EXTRACTING METALS FROM THEIR SULPHIDES.—Antoine H. Imbert, Grand-Montrouge,, France.

807,290. METHOD OF PROVIDING FOR EXTINGUISHMENT OF FIRES IN MINES.—Joseph Krzyzanowski and Stanislaus Wysocki, Juzowka, Russia.

807,291. BRAKE.—Homer T. Lambert, Thacker, W. Va.

807,298. MANUFACTURE OF GLASS SHEETS.—John H. Lubbers, Allegheny, and Samuel L. Bodine, Berwyn, Pa., assignors to Window Glass Machine Company, Pittsburg, Pa., a corporation of New Jersey.

807,399. GAS ROCK-DRILL.—John V. Rice, Jr., Edgewater Park, N. J.

807,412. PROCESS OF PURIFYING WATER.—John F. Wixford, St. Louis, Mo.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Dec. 2, 1905.

24,198 of 1904. TREATMENT OF ARSENIC.—F. Howles, London. The inventor treats the sulphides of arsenic, obtained in the purification of sulphuric acid, with soda ash, thus forming thio-arsenic salts of soda; then adds hydrated oxides of iron, producing arsenite of soda.

26,093 of 1904. CRUCIBLE FURNACES.—R. Lindemann, Osnabruck, Germany. Improvements in crucible furnaces with the object of economizing the heat used.

28,406 of 1904. DUST SEPARATION.—F. W. Dick, Rotherham. Improved apparatus for separating dust from blast-furnace gases.

28,353 and 28,647 of 1904. COAL-CUTTING MACHINE.—F. W. Hurd, Bothwell. Improvements in the inventor's coal-cutting machine, particularly for the purpose of supporting the cutter bar.

5,953 of 1905. SEPARATION OF SULPHIDES.—A. S. Elmore, London. In flotation processes for separating sulphides from gangue, adding to the liquid a soluble chloride such as calcium chloride, together with a small proportion of free hydrochloric acid.

11,237 of 1905. COAL-WASHING PROCESS.—F. Baum, Herne, Germany. Improvements in the inventor's coal-washing process, with the object of more rapidly removing the water in the fine coal.

13,093A of 1905. FEED FOR ELECTRIC DRILLS.—W. O. Duntley, Chicago. Improved feed device for the inventor's portable electric drill.

15,808 of 1905. BALL OR TUBE MILL.—J. Wüstenhoefer, Dortmund, Germany. Roller or ball mills for reducing ores to impalpable powder, in which the rollers or balls are held up to the grinding surface instead of being allowed to fall.

16,753 of 1905. SAFETY-LAMP.—J. Prestwick, Manchester. Improvements in miners' safety-lamps having two cylindrical glasses around the burner, chiefly with the object of cheapening the manufacture.

Week ended Dec. 9, 1905.

4,388 of 1905. BUDDLE.—C. W. Denison, Denver, U. S. A. Making buddles to collect gold concentrates of duck or canvas placed loosely over coarse wire netting held on radial arms.

4,744 of 1905. AMALGAMATOR.—D. Draper and G. A. Hay, Johannesburg. A drum amalgamator, to be used in connection with stamp-mills instead of the ordinary battery plates, the amalgamator having automatic scrapers, which obviate the necessity of stopping the mill to clean up.

5,367 of 1905. STEEL FURNACE.—J. J. Hudson, Philadelphia. Improved furnace for refining iron or steel by means of charcoal and subsequently decarburizing.

5,625 of 1905. SAFETY-CATCH FOR MINE CAGES.—C. Vernon, Nottingham. Improved safety apparatus for supporting mine cages in case of overwinding or the breakage of the winding rope.

8,642 of 1905. RECOVERY OF ALKALINE BICHROMATE.—P. Romer, Bernburg, Germany. In obtaining alkaline bichromates by heating chrome iron ore with an alkaline carbonate, using at each charge only a half or third of the latter as is necessary to act on the whole of the former; in this way, the ore does not fall to the bottom nor the molten alkali ruin the furnace lining.

12,320 of 1905. ROASTING FURNACE.—J. E. Greenawalt, Denver, U. S. A. A reverberatory roasting furnace, having a porous hearth through which plentiful supplies of air can be introduced into the charge.

14,061 of 1905. COKE BRIQUET.—A. D. Shrewsbury, Washington, D. C. Apparatus for producing non-porous briquets of compressed coke.

14,409 of 1905. RECOVERY OF GOLD.—E. Biguet, Paris. Extracting arsenious acid from auriferous pyrites by volatilizing on closed muffles at 750° C., and subsequently withdrawing the fumes and oxidizing them; in this process the precious metal is left behind.

16,643 of 1905. ELECTROMAGNETIC SEPARATION.—E. Primosigh, Budapest, Hungary. Improved apparatus for electromagnetically separating iron ores of different permeability.

19,539 of 1905. BRIQUET-MAKING.—W. van der Heyden, Paris. The use of dilute liquid glue as a binding agent for briquetting purposes, and the subsequent hardening of the mixture by means of formaldehyde.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Chas. Janin, mining engineer, of San Francisco, is at present in Mexico.

Dr. Joseph Hyde Pratt, of Chapel Hill, N. C., has gone to Arizona on professional business.

Mr. E. A. Ashcroft is in New York, and will shortly leave for Mexico on professional business.

Mr. Robert E. Harris, of Halifax, president of the Nova Scotia Steel Co., was in Ottawa this week.

Mr. T. W. Robinson, general manager of the Illinois Steel Co., was at Duluth and adjacent points recently.

Mr. W. G. La Rue, discoverer of the Baraboo iron district of central Wisconsin, has been visiting at Duluth.

Mr. John J. Reilley, of the Argentine district, Colorado, has returned after a trip to Nevada mining fields.

Mr. C. H. Pate, of Sunshine, Colo., superintendent of the Hope property, is in Chicago, Ill., on a business trip.

Mr. Stephen Hoskin, a well known mining man of Gilpin county, Colo., has gone to California to spend several months.

Mr. F. S. Colton, of New York, during his recent visit to Bullfrog, Nev., purchased the Rush group of gold-mining claims.

Mr. P. G. Lidner has gone to British Columbia to examine some mines. He will be absent from New York about three weeks.

Mr. F. W. Denton, of Painesdale, Mich., agent of the Copper Range Consolidated Co., is at Palm Beach, Florida, with his family.

Mr. F. Milton Johnson, of Boston, has gone to Brazil on mining business, which will probably occupy him about six months.

General Manager C. H. Merrill, of the Inter-Ocean Mining & Milling Co., of Sunshine, Colo., is making a business trip to Chicago and eastern points.

Mr. J. R. Underwood, formerly with the Granby Mining & Smelting Co., is now superintendent for the St. Louis Smelting & Refining Co., at Collinsville, Illinois.

Dr. Tadashira Inouye, professor in the Imperial University at Tokyo, Japan, has been in the Black Hills, South Dakota. He is studying American mining methods.

Mr. Ben C. Kingsbury and Mr. Patrick Clark, who own extensive mine interests in the Cour d'Alene district of Idaho, are visiting Butte in connection with a mining deal.

Mr. Howard Smith, of the firm of Janin, Stebbins & Smith, of San Francisco, has recently returned after making examinations of mining properties in California.

Mr. J. H. Plummer, president of the Dominion Iron & Steel Co., Sydney, N. S., sailed from New York for Europe on Dec. 9. He will remain abroad for some months.

Mr. James W. Neill, consulting engineer for the Pittsburg & Montana Copper Co., who has been in Butte, Mont., on business, has returned to San Francisco, his headquarters.

Mr. J. C. Fleschhutz, manager of the Pewabic Consolidated Co., operating in Russell district, Gilpin county, Colo., is making a business visit to Pittsburg, Pa., and other eastern points.

Mr. John Seward has returned to New York from a three months' trip to Chihuahua, Mexico, and Goldfield, Nevada. He will leave shortly for Arizona to examine some mining properties.

Mr. H. C. Hoover is inspecting a number of gold mining properties in Western Australia, in the interests of Messrs Bewick, Moreing & Co. Mr. Hoover proposes to visit London shortly.

Mr. William Dunbar Jenkins, of Philadelphia, representing the firm of Waddell & Hedrick and the Simplex Concrete Piling Co., of that city, is traveling in the Canadian west, studying the conditions of the country.

Mr. A. S. Dwight, general manager of the Greene Consolidated Copper Co., of Cananea, Sonora, Mexico, and Mr. Harvey Kirk, assistant superintendent of mines there, are visiting Duluth and the Lake Superior ranges.

Mr. Hugh Fletcher, of the Canadian Geological Survey, was presented with a gold watch and chain at the recent meeting of the Nova Scotia Mining Society at Halifax, in recognition of his services to the mining industry of that province.

Mr. John McKane, of Tonopah, recently made an extended visit to the Death Valley mining fields, in company with Mr. Donald B. Gillies, his consulting engineer. The Schwab-McKane Co. holds extensive interests in Death valley claims.

Professor Charles H. Fulton has been appointed president of the South Dakota School of Mines, at Rapid City, S. D., to succeed Dr. R. L. Slagle, who becomes president of the State Agricultural College. Professor Fulton is well known as a mining engineer, a cyanide expert and a writer of much ability.

Mr. Harry Coulby, of Cleveland, O., who has been at the head of Lake Superior, getting some of his company's ships off the rocks there, has returned to Cleveland. He was quite successful in his operations, releasing the ship *W. E. Corey* and the *Crescent City*, and beginning wrecking operations on others of the fleet.

Governor Warner has appointed Judge Norman W. Haire a member of the board of control of the Michigan College of Mines, to succeed W. E. Parnall, resigned. Judge Haire succeeded Mr. Parnall with the Bigelow syndicate of mines, having been elected vice-president, director and general manager of the various properties.

Prof. F. A. Jordan, of the department of mathematics and physics at the Michigan College of Mines, Houghton, has resigned to accept a position with the Continental Zinc Co., in the Joplin district. He is succeeded at the college by C. D. Hohl, a former graduate. Mr. Hohl resigned a position with the Lake Superior Smelting Company.

Mr. John F. Snyder, who for the past 45 years has been the chief mining engineer of the Coal Department of the Lackawanna Co., has retired under the pension system of the company, and is succeeded by Arthur C. Lamonte, promoted from assistant chief engineer. The company has 24 breakers and of these 23 were built under the supervision of Mr. Snyder.

Capt. James Milligan, of Calumet, Mich,. head mining captain of the Calumet & Hecla Mining Co., has resigned owing to failing health, his action taking effect Dec. 31. He has been in the Calumet & Hecla's service for 33 years without interruption. Captain Milligan was one of the original promoters of the successful Calumet & Arizona mine at Bisbee, Arizona.

Col. Reese A. Phillips, general superintendent of the Coal Department of the Lackawanna Co., was entertained by a number of his friends at his home, in Scranton, recently, upon his birthday. He was presented with a cabinet buffet by Hon. John R. Farr, on behalf of his friends, who pointed out that Col. Phillips had risen from the position of breaker boy to the head of department in charge of 15,000 men and boys, and that in his connection with his small army of employees he had been most successful, being the only superintendent in the anthracite region who had not been called upon to defend a grievance before the Conciliation Board.

Obituary.

W. H. Dixon, the inventor of the Dixon hand rock-drill, while on a visit to the Cash mine, at Gold Hill, Boulder, Colo., fell a distance of 60 ft., from the 300-ft. level to the bottom and was instantaneously killed.

Geo. C. Munson, a pioneer metallurgist, connected with a number of reduction enterprises of the early days of Colorado, died suddenly at Denver, aged 75 years. Of late years he had been engaged in looking after the ore shipments from a number of mines in Idaho and the Northwest.

William Chisholm died suddenly in Cleveland, O., Dec. 6, aged 62 years. He graduated from the Philadelphia Polytechnic College and went to Chicago as president and manager of the Union Rolling Mill Co., which his father had established; this concern was later acquired by the Illinois Steel Co. In 1880 he assumed temporary management of the Cleveland Rolling Mill Co. and upon the death of his father a year later he became president and manager, a position he retained until the plant was sold to the American Steel & Wire Co. He then retired from active business life, though retaining his interest as vice-president in the Union Steel Screw Co., as director of the Lakeside & Marblehead Railroad Co., and in the Kelley Island Lime & Transport Co., the Riverside Foundry Co. and various banking and transportation concerns. He was a prominent philanthropist, being president of the Cleveland Protestant Orphan Asylum at the time of his death.

Capt. Samuel Smith Brown, coal operator, Pittsburg, Pa., died at his home, at Brown's Station, Pittsburg, on Dec. 11. Captain Brown was born in 1842, in Minersville, now the Thirteenth ward, Pittsburg. His father, William H. Brown, was a miner, who accumulated sufficient money to start in business for himself. He soon amassed a fortune. When the elder Brown died, S. S. Brown became active in the management of the coal interests and, with his brother, W. Harry Brown, formed the W. H. Brown's Sons Coal Co. Their principal enterprises were at Boston, Pa., but they also maintained a large boat-yard at Brown's Station. Captain Brown owned a number of boats in the Mississippi trade. He was president of the Arkansas Packet Co., Cairo Coal Co., Monongahela Packet Co., director of the Monongahela River Consolidated Coal & Coke Co., Marine National Bank and president and principal owner of the Homestead & Pittsburg Bridge Co. Captain Brown was also president and practically sole owner of the Brown Hoisting Machinery Co. He had extensive real estate interests and was considered a far-seeing buyer when purchases were made for investment. The full scope of his financial operations was large, and he was interested in enterprises in all parts of the United States.

Societies and Technical Schools.

Colorado School of Mines.—The following changes have taken place in the faculty of the Colorado School of Mines, at Golden, this year: W. G. Haldane has been advanced from instructor to assistant professor of metallurgy; W. F. Allison from instructor in surveying to assistant professor of civil engineering; C. E. Smith has been appointed instructor in geology to take the place of J. W. Eggleston, who resigned to accept an instructorship in Harvard University, and A. J. Hoskins, formerly with the Leyden Coal Co., was appointed assistant professor of mining engineering. Under the new administration the laboratory equipment, especially in ore dressing, is rapidly increasing.

Franklin Institute.—At the stated meeting in Philadelphia, Dec. 20, a paper was read on "Hydraulic mining in British Columbia and Alaska," by Howard W. DuBois, mining engineer, Philadelphia. This communication was illustrated by a large number of technical slides, which showed in detail the methods of prospecting and mining the ancient river channels which contain the auriferous deposits. In addition a number of colored views of general scenic interest were shown of this region.

Trade Catalogues.

The E. Keeler Co., Williamsport, Pa., issues a catalogue of water-tube boilers.

The annual edition of the Brown & Sharpe Mfg. Co.'s blue book is about to be issued.

A new list of chemicals has been issued by the Baker & Adamson Chemical Co., Easton, Pa.

A new edition of "Data concerning Platinum" is published by Baker & Co., Newark, N. J.

The Perrin Filter Press is described in catalogue No. 9 of William R. Perrin & Co., Chicago, Ill.

The Kennedy Valve Mfg. Co., 57 Beekman street, New York, issues its catalogue of valves.

Pamphlet "K' is a catalogue of the Samson turbines as manufactured by James Leffel & Co., Springfield, O.

Engineering, surveying and scientific instruments made by them are described in the new catalogue of J. C. Ulmer & Co., Cleveland, O.

The Walker A. Zelnicker Supply Co., East St. Louis, Ill., issues a handsomely bound catalogue of contractors and general supplies.

From Marathon, Cortland county, New York, comes the annual catalogue of road machinery made by the Climax Road Machine Company.

The Jeffrey Manufacturing Co., New York and Chicago, issues its new catalogue of chain belting, elevating and conveying machinery.

Henry Maurer & Son, 420 East Twenty-third street, New York, issue their catalogue of fire-brick and terra-cotta for building purposes.

A handsome catalogue describing their centrifugal pumping machinery is published by the Morris Machine Works, Baldwinsville, New York.

The McClintic-Marshall Construction Co., 21 Park Row, New York, publishes a handsome booklet illustrating the construction of buildings erected by it.

Heating, ventilating and cooling plants, type "S" and type "MP" generators and motors are described in bulletins issued by the C. & C. Electric Co., 149 Broadway, New York.

Hoisting machinery of this well-known make is described and illustrated in catalogue "E" of the Rawson & Morrison Mfg. Co., 31 Main street, Cambridgeport, Boston, Mass.

"Superheated Steam" is the new catalogue of the Power Specialty Company, 111 Broadway, New York. The company also issues bulletins describing the Rife hydraulic engine.

The Borden & Selleck Company, 48-50 Lake street, Chicago, Ill., publishes catalogue No. 5, describing conveying and elevating machinery, and booklet No. 6, showing applications of its product.

A new catalogue (No. 13) of coal-handling machinery is issued by the Mead-Morrison Mfg. Co., 11 Broadway, New York. This company succeeds the John A. Mead Mfg. Co., of New York and Rutland, Vt.

Industrial.

The completion of the Ambridge plant of the American Bridge Co. increases the output to 700,000 tons per annum instead of 600,000, as heretofore.

The Vulcan Iron Works Co., Cleveland, O., reports that it is now receiving an unparalleled volume of orders; sufficient to cause the contemplation of more extensive works.

The wire hawsers for use in towing the drydock *Dewey* to the Philippines are 2 in. diameter and 1,200 ft. long. They were furnished by Jno. A. Roebling's Sons Co., Trenton, N. J.

The Bedford Quarries Co., Bedford, Ind., and the Ohio Quarries Co., North Amherst, O., have placed orders with the Sullivan Machinery Co., Chicago, Ill., for 18 stone-channeling machines.

Center furnace, at Hematite, Trigg county, Ky., has been blown in after many years of idleness. Cold-blast charcoal pig iron is being made. The furnace is operated by White, Dixon & Co., under lease.

The Maryland Steel Co., Sparrows Point, Md., has secured the contract for building three steel tugboats and one steel self-propelling lighter for the Pennsylvania Railroad Co. The tugboats will be 105 ft. over all.

The two 20-ton basic open-hearth steel furnaces of the Empire Steel Works, at Elmira, N. Y., have been leased by the

Lucknow Iron & Steel Co., of Harrisburg, Pa. The train of rolls connected with the works is still idle, but the furnaces have been started.

The Dominion Iron & Steel Co.'s rail mill recently rolled 1,100 tons of rails in one day, breaking its previous highest record. It has about completed the Grand Trunk Co.'s 25,000-ton order, and the Intercolonial's 25,000-ton order is to be commenced at once.

The Cleveland Crane & Car Co., at its plant at Wickliffe, O., is filling an order of the American Cast Iron Pipe Co., Birmingham, Ala., for six heavy pipe foundry cranes and another order for a large gantry crane for the Missouri Pacific railway yards at St. Louis.

The New York State Steel Co., Buffalo, N. Y., has commenced the erection of the new plant it is to build on the Buffalo river. Spencer Kellogg is president, and S. R. Mann, secretary and treasurer. The company will convert pig iron into steel billets by the Talbot proces.

Within the past few days the C. H. Shaw Pneumatic Tool Co., of Denver, has made shipments of its eclipse air-hammer rock drills to California, where twelve were sent in one shipment; to Copper Creek, Ariz.; to North Carolina; to Oaxaca, Mexico, and to Leadville, Colorado.

The Hydraulic Machine Co., Pittsburg, intends enlarging its plant preparatory to a change of method in operating. The steel casting business will be separated from the iron and brass foundry departments, and organized as an independent company under the name of the Iron City Steel Castings Company.

The Century Coke Co., near Brownsville, Pa., has been bought by C. E. Lenhart and J. H. Hillman & Son, of Pittsburg, for $507,000. Thirty coke-ovens are now in operation and 200 more will be built in the near future. Considerable new construction is contemplated and equipment, especially boilers and machinery, will be needed. The property contains 350 acres.

At a meeting of the directors of the Wire & Telephone Co. of America, held at the office in Rome, N. Y., Dec. 8, the following changes were made: J. S. Dyett, of Rome, N. Y., was elected president, to succeed C. F. M. Niles, of Toledo, O.; Oliver Shiras, of Rome, N. Y., was elected vice-president, to succeed J. S. Dyett; S. H. P. Pell, of Pell & Co., New York, was elected a director.

At the annual meeting of the Connecticut Valley Metal Trades' Association held Nov. 27. at Springfield, Mass., the following officers were elected: President, Richard D. Reed, Westfield; vice-president, C. P. Fay, Chicopee Falls; secretary, F. C. Breakspear, Chicopee; treasurer, Springfield National Bank; executive committee, F. C. Fieker, Northampton; A. A. Coburn, Willimansett; M. W. Bushnell, Thompsonville, and T. J. Rider, Springfield.

The Lackawanna Steel Co. is making active preparations toward starting its Buffalo by-product coke-oven plant. The Lebanon plant, which has been successfully operated for the last three months, has been altered so that the ovens will permit the charging of loose coal from the top; originally, they were charged at the end with coal in the form of compressed cakes. The changes were made by Jepson, Mason & Co., Buffalo, who are now filling a like contract on the 300 ovens of the Buffalo plant.

Construction News.

Joplin, Missouri.—The Live Oak Zinc Co. intends to develop and operate zinc mines in this district.

Asheville, North Carolina.—The Georgia Talc Co. is to develop mines near here. J. F. Glenn is the director.

Huntington, West Virginia.—The Dingess Run Coal Co. will develop land which it controls on Dingess run.

Gray, North Carolina.—The Gray Mining & Development Co. will develop the Gray gold mine. J. H. Gray is interested.

Apex, Colorado.—Air-compressors and other machinery are to be installed on the Ingram mine. Ira Pollard, of Apex, is in charge.

Ocala, Florida.—The Ischatta Co. proposes to develop phosphate mines near this place. O. T. Green, of this place, is interested.

Missoula, Montana.—C. F. Arnold, president of the Albion Mining Co., is figuring on putting in a small smelting plant next spring.

Georgetown, Colorado.—A 25-ton concentrating plant is to be put in on the American Sisters property. J. J. White, of Georgetown, is manager.

Boulder, Colorado.—The Concord Mining & Milling Co. proposes to put in a 100-ton mill on its property. W. J. Thomas, of Boulder, is treasurer.

Charleston, West Virginia.—E. P. Mucklow, of Scranton, Pa., is to develop coal properties in the Paint creek field, having a daily output of 3,000 tons.

Charleston, West Virginia.—Davidson Bros. will erect a plant for the manufacture of sand-lime brick. It is to have a daily output of 10,000 bricks.

Galena, Missouri.—E. R. Mower is reported to intend building two ore mills to handle the product of zinc mines which he has leased near this place.

Silver Plume, Colorado.—A compressor and electric plant are to be put in on the Silver Leaf property. B. J. Martelon, Idaho Springs, Colo., is manager.

Uniontown, Pennsylvania.—The Baxter Ridge Coal & Coke Co. has started to develop 12 acres of coal near Smithfield, and will build 20 ovens in the spring.

Cumberland, Maryland.—The George's Creek Fuel Co. proposes to develop and operate coal mines in this district. Joseph P. McKenna, of this place, is president.

Charleston, West Virginia.—The Kanawha & Pittsburg Coal Co. will mine coal on 100,000 acres of land containing two seams, in this district. Edward M. Craig is secretary.

Rollinsville, Colorado.—The Golden Iron Mining & Milling Co. will instal an air-compressor plant at its mine in the Perigo district. E. F. Butler, Kittredge building, Denver, is in charge.

Deadwood, South Dakota.—The Clover Leaf Mining Co. intends to put in a pumping plant of large capacity; also to enlarge its stamp-mill. Pierre Wiebaux, of Miles City, Montana, is president.

Hoffmanville, Maryland.—The Rockdale Powder & Dynamite Co. will make extensive improvements to its plant here, and arrangements will also be made for developing mineral properties.

Russellville, Alabama.—The Louisiana-Alabama Coal Co. is considering the development of iron-ore deposits near this place. S. B. McConico is president, and the main office is at New Orleans, La.

Tazewell, Tennessee.—J. F. Elsom, of New Albany, Ind., has been engaged as consulting chemist to Miller, O'Bryan, Smith & Elsom, who will develop 1,000 acres of zinc lands in Claiborne county.

Chihuahua, Chihuahua, Mexico.—Governor Creel reports that the smelter plans for the plant to be erected in Chihuahua by the American Smelting & Refining Co. have been approved. The initial plant will be 750 tons, while the plans will provide for future improvements and additions that are contemplated.

Shasta County, California.—Plans are being drawn in Salt Lake City for the erection of a large smelter at the Balaklala mine in Shasta county, California. The smelter will have a capacity of about 400 tons of ore a day, and it will be located about 3½ miles from the mine. The ore will be conveyed from the mine to the smelter by an aërial tramway.

Jackson, Alabama.—George H. Schuler, of Birmingham, vice-president of the Southern Steel Co., is in charge of plans for the enlargement of the company's open-hearth steel plant at this place. A rod mill and finishing plant and workmen's cottages will also be erected. The Garret-Cromwell Engineering Company, of Cleveland, O., are engineers.

Special Correspondence.

San Francisco. Dec. 13.

Since the recent revelation by the secretary of the California Débris Commission, going to show that some of the "watchmen" of the Anti-Débris Association had been soliciting bribes from miners to permit them to continue hydraulic mining without licenses and without interference, attention has been called to the doings of the latter association. It had, of course, no official knowledge of the alleged bribery by its agents, but has failed thus far to take any active part in prosecuting them. For these reasons the matter of a complete reorganization of the association is now under consideration. At present it is supported only by the counties of Sacramento and Sutter, but if the proposed reorganization is brought about Yuba county will again become a member. The boards of supervisors of Sutter and Yuba counties have been in consultation, and the matter will be brought up at the January meeting. The plan is to do away entirely with the present association and substitute for the men now controlling it, the various boards of supervisors of the Valley counties interested in the débris question. Morrison, of Yuba county, suggests that the control of the reorganized society should be placed in the hands of the Yuba and Sutter supervisors as representing the counties most concerned. He would do away with the watchmen, it is understood, now employed and have this work done by the supervisors themselves. Some years ago Morrison went to the mountains disguised as a miner and secured work in various mines. On his return he denounced the detective methods in vogue, and favored such a reorganization as is now proposed by the Sutter board. He failed then to arouse any public interest, and the matter was finally dropped.

Sacramento county has been one of the main contributors to the old association, it is pointed out, and Yuba and Sutter cannot well afford to disregard the wishes in the matter. Nor is it certain that Yolo and Colusa would support the reorganized body. It is understood in any event that in future the watchmen (or spies, as the miners term them) will be appointed by the supervisors of the respective counties instead of by the Anti-Débris Association. All this shows that the Anti-Débris men intend to keep up an active fight against the hydraulic mining industry in the drainage basin of the Sacramento and San Joaquin rivers; and the California Miners' Association will have work cut for it to counteract this adverse influence.

It may be said that the California Miners' Association is endeavoring to get some law passed for the punishment of those who have been intimidating hydraulic miners, as is shown by resolutions adopted at the recent convention.

In Kern county the Santa Fé railroad, which is an equal partner with Chanslow & Canfield in the great Midway holdings, has gone into oil at 1,320 ft. on section 24-32-23, and the strike is important in that it proves a big territory embraced in the lands purchased by the Santa Fé, and also because it widens the belt on the west side in that particular locality by fully a quarter of a mile. It proves the whole section 25, over which there has been so much litigation and makes that land of even greater value than those who have been contending for it knew. The well is on the land in which the Santa Fé paid Chanslow & Canfield $800,000 for an equal partnership, the entire teritory embracing several thousand acres.

Drills are about to be put to work on the Albert Bemmerly place in the tule, 7 miles northeast of Woodland, in Yolo county, to prospect for gold-bearing soil. If tests are successful the ground will be utilized for dredges.

J. J. Garvey has sold his placer mine, on Garvey Bar, situated one mile above the head of Humbug creek, which is 12 miles northwest of Yreka, Siskiyou county, for $30,000, to A. W. Graham, who represents the Risdon Iron Works, of San Francisco.

Plans are reported under consideration for an electric plant of 2,000 h. p. at Needles, San Bernardino county, to furnish light and power to a number of concerns in that town, and also to mines in the San Francisco district. The plant is to be operated by steam, as there is no water-power to be had. Oil will be shipped from Bakersfield or Los Angeles, and it is said that the Santa Fé has agreed to deliver it at $1 a barrel. Five hundred horse-power is to be utilized at Needles, 500 at the Gold Roads mine, 300 by the German-American and 200 by the Vivian. The remaining 500 will find ready sale.

Tonopah. Dec. 16.

Although the Tonopah railroad has been very profitable, the directors recently asked such high rates for the short extension to Goldfield, a distance of 25 miles, that mine-owners refused to ship ore. As a consequence the railroad company rearranged its schedule, making an all-round reduction. Goldfield residents, however, are unanimously of opinion the revised rates are still much too high. Within the last few months the conditions have greatly changed at Goldfield. Prior to that time most of the properties were worked by lessees, who were obliged to rush their ore to market regardless of cost and the railroad proceeded to squeeze the last cent out of them. Now nearly all the mines are in the hands of owners, who are combined to hold their ore, and may, if necessary, shut down to bring the railroad to terms.

The following are the new rates, the local to Mina, the terminus of the Goldfield road, and the through charge to smelters at Denver and Salt Lake: Ore not over $30, Goldfield, $2.10; Tonopah, $1.50. From this point rates increase according to values, the higher ones being as follows: Ores over $100 but not over $150, Goldfield, $6.50; Tonopah, $4.60; from Mina, $11.50; over $200 but not over $250, Goldfield, $7.75; Tonopah, $5.54; from Mina, $12.15; over $250 but not over $300, Goldfield, $8.40; Tonopah, $6; from Mina, $12.50. On ore or concentrate of over $200 a rate of from 2 to 5% of the value is charged.

It was known in Tonopah for more than a year that the West End mine possessed a quartz lode of large dimensions, but the assay values were disappointing. The recent strike, however, has changed the prospects of the mine, and justified the good opinions of the several large shareholders who tenaciously held on to the property in the face of severe discouragements. Recent operations have been confined to the 415-ft. level. A crosscut was run from the 415 station to the southeast about 40 ft. on the ledge of low-grade ore encountered in the shaft at a depth of 390 ft. The values for the first 30 ft. ran from $8 to $12 a ton, but within the next 10 ft. they rose rapidly, until the face was in ore of good shipping grade. At a point 40 ft. from the shaft, a drift was started to the west, and this drift is now out 150 ft. to the west. It is in ore ranging in value from $50 to $80 a ton for the entire distance. About midway in this west drift a crosscut was run to the south and encountered a wall at a point 31 ft. from the drift. This wall dips to the south at an angle of 45°, and has the appearance of being the hanging-wall. A drift has been run along this wall for a distance of 30 ft., and for this entire distance there is a streak of sulphide ore from 2 to 4 ft. wide that carries large quantities of argentite and is thickly plastered with ruby silver. Careful sampling of this rich streak indicates values running close to $1,000 a ton. An assay made recently showed values of 500 in gold and $700 in silver. At the extreme western end of the west drift a raise is being put up, and is in ore of very high grade. The present developments show that the shoot of rich ore is 150 ft. long and at least 40 ft. wide. It is believed that the entire mass, just as it is broken down, will run from $60 to $80 a ton.

A new ore-shoot has been discovered in the Montana, close to the Midway boundary. The face of the drive is in high-grade shipping ore. In the dump on this mine there are about 12,000 tons of ore assaying between $20 and $25 per ton. Experiments are being made with the ore to determine a suitable method of treatment. The company's assayer has demonstrated that fine crushing, concentrating and cyaniding without roasting will extract 90% of silver and gold. This process will probably be adopted.

The Tonopah-Cedric Co. has struck good ore in its mine at Liberty, 18 miles

north of Tonopah. In the tunnel, which is now in 270 ft., a streak of ore, plastered with hornsilver and argentite, has been opened up. This tunnel is about 150 ft. below the surface, giving that depth of backs. The company has ordered cars and rails, and will at once begin drifting both ways on this ledge. Shipping ore has also been opened up in four places on the main ledge, indicating that the ore shoot is fully 1,000 ft. long. This mine, under the name of Liberty King, was worked in 1864 by the Potomac Mining Co., and large quantities of good ore were shipped from the mine at that time. One old cut on the ledge, which has just been cleaned out, shows a streak of silver sulphide that is estimated to assay $2,000 a ton.

Socorro. Dec. 12.

The Organ district of Doña Ana county had a splendid display of ores at the American Mining Congres at El Paso, illustrating its great resources in gold, silver, copper and lead. This district has a length of 30 miles and includes the Organ mountain, Black mountain, and San Andreas mining camps. Though mined in Spanish times, it has only recently had much attention from Americans. It lies 15 miles northeast of Las Cruces and 45 miles north of El Paso. Starting south, from a point 15 miles north of Organ camp, we find bodies of lead that lie along a lime and porphyry contact; a few miles farther south is the Little Buck (noted for its yield of precious metals) and then come the Jim Fisk, Merrimac and Big Mack mines, all now showing good values. Nearer Organ camp are the copper mines; the Excelsior has shipped many cars, netting $700, with ores exceeding 50% copper; the Torpedo and Memphis are also now sending out good copper values and the latter mine's owners are planning to spend $50,000 on developments. The concentrating mill of the old Stevenson-Bennett mine is running full time to produce six tons of concentrates daily. At the Modoc silver-lead mine, eight miles south of Organ, a new dry concentrator is just finished and the mine's output must be increased to supply it with ore.

In southern Santa Fé county there are rumors of a revival, in the Silver Buttes district at San Pedro, where the Santa Fé Gold & Copper Co. own a mine, equipped with a modern copper smelter, that has been closed down over two years. If the copper mine starts, so will the Block coal mine, owned by the same people, a few miles to the north; and in all some 300 men will be employed. On old Placer mountain, near Golden, the Yankee Boy mine has been leased by the New Mexican and Galisteo companies to G. S. Morrison and A. B. Renehan, of Santa Fé.

In the Red River district of Taos county, the New Mexican Chemical Amalgamated Co. proposes to erect a mill. Henry H. Hawkins, at Springer, is their agent. The Independent mine is hauling ore to the railroad for shipment to the Pueblo smelters. The Eureka, Rock of Ages, Carlotta and Verde claims are undergoing development and the two last have a good showing of copper.

In the northern part of Percha camp, in the Kingston district of Sierra county, Col. Harris recently bonded a low-grade mine, abandoned for many years, to the Moffit Mining & Milling Co. A 100-ton concentrator is building and will soon start.

The Phœnix Prospecting Co., operating in the Cook's Peak district of Luna county, has lately taken up its bond on the old Flower Queen properties, now including the Dewey, Olympia and Alto claims. This group contains over 3,000 ft. of workings and has yielded in the past hundreds of tons of good ore; the tunnel of the Phœnix Co. is now in some 250 ft. and shows lead seams that give promise that the main orebody is near.

Bisbee. Dec. 14.

In the work on the 1,000-ft. level north, of the Lake Superior mine, copper running from 10 to 28% was cut in a crosscut off the main drift. This has widened and increased in value till now it is the entire breast of the drift and is up to 43% copper. The find promises much. It is in a part of the mine where large and rich finds were expected, and where much more is to be looked for. This main drift is now making connection through with the Oliver workings of the Calumet & Arizona, the Buckeye claim, and it is already proving a great assistance to the ventilation of the mines. Lake Superior is sending about 1,000 tons per week to the smelter and its first month's return from Douglas showed high average earnings.

Calumet & Pittsburg mine is now cutting station on the 1,128-ft. level Briggs shaft, for the main drifts which are to start from there. This will take a few weeks and drifting will follow with all speed. The mine seems at last to have conquered the water that has bothered it for many months, and is almost sure to go ahead smoothly. Water is still coming at the rate of 2,400 gal. a minute, but it is from the bottom of the sump, which is 10 ft. below the level. During the week a drift into this mine from Junction shaft has disclosed copper running about 8% pitching into Calumet & Pittsburg and this is being followed. The Hoatson shaft is going down steadily, but has not made the record speed of the previous month.

At the Denn they have made the camp's record in sinking; an average of 106 ft. per month since they began to put up buildings at the site of the three-compartment shaft and the total costs, including buildings, etc., have been $54.50 per foot. This shaft is now within about 200 ft. of the ore cut by drill last year, and the shaft will be sunk to 1,000 ft. before drifting begins.

The Apache Development Co. is to be organized at Duluth, Minn., to handle the old Apache mine, at Victoria, east of here, by Martin Pattison and others of that city. The mine has a shaft down about 50 ft. and has been making some copper from the oxide ores found there. It is supposed that the ore continues some distance down and explorations will be carried on with that end in view. John E. Penberthy is in charge.

Floods last week at Clifton did not damage the mine and smelter plants as severely as was thought at first. The dams and walls built last year for such an occasion were the saving of both mines and mills. The town was severely damaged, and hardly a house-owner but lost materially, or was swept away.

It is proposed to form an Arizona Miners' Association to be composed of men interested in mining throughout the territory, and a meeting is to be held in Phœnix this month for the purpose.

At the Saginaw mine here the drift on the 900-ft. level has cut ore and is still working in it. This is not only a most encouraging matter for Saginaw but for the American, which is now bounded on three sides by companies having found copper—Junction, Calumet & Pittsburg and Saginaw. A drill will be started on American in a few weeks, to test the formation at depth.

The Anglo-Development Co. has decided to resume work on the Ray mine at Kelvin, which has been under examination by experts for the past few months. This is a great body of low-grade ore, and is to be concentrated at the mine and smelted at some point not yet decided on. A Mr. Gordon, not the manager of the company, though of the same name, is now on his way to London to complete arrangements for the resumption. A large amount of money has been put into this property.

More examinations are being made of the Copper Buttes property near Kelvin, in the hope that capital can be interested to develop it. This mine has such a large amount of issued stock and so many stockholders that it is very hard to work anything out of the chaos its affairs are now in.

The Michigan & Arizona Development Company, which has spent $100,000 on the old Helvetia mine in the last two years, under an agreement with the directors of that concern, has now issued a circular to the Helvetia stockholders in which is cited the facts of development and the fact that a mine has been found, and say that they are now organizing the Helvetia Copper Co., capital $5,000,000, under the laws of New Jersey, which will exchange Helvetia stock, share for share,

the new stock $10 paid and subject to assessment up to $15. Some 30,000 shares of the old company have not yet availed themselves of the opportunity to change, and the circular is to the effect that they may do so up to Dec. 31 next. Chas. C. Prindle, of Minnesota, is president of the Development Company.

Denver. Dec. 15.

One of the largest transactions during the past few months has just been closed by the transfer of the Theresa property at Cripple Creek to the Golden Cycle Mining Co. for a consideration of $525,000. The latter company has also purchased the Telluride mill at Colorado City, formerly the property of the General Metals Co., for $144,000. Under the direction of Philip Argall the plant will be overhauled and the necessary improved machinery installed to make it a first-class cyanide plant, with a capacity of 300 tons per day.

As a probable result of the proposed assessment of the individual holdings of stockholders in Iowa, the Portland Gold Mining Co. has become a Wyoming corporation. In the latter State the laws are a good deal more liberal to corporations than they are in Iowa.

In consequence of the Cripple Creek & Colorado Springs District Railway purchasing the holdings of James F. Burns, the latter's suits against that corporation have been dismissed. The trials of these suits were being looked forward to with considerable interest, as only very few precedents exist—only one in this State, when a few years ago J. W. Gates tried to secure control of the Colorado Fuel & Iron Company.

The cyanide plant which was erected on the Wild Horse property, on Bull hill, near Cripple Creek, was sold a few days ago to the United Gold Mines Co. The consideration is said to be about $75,000.

Beginning with the new year 1906, upon compliance with certain conditions, all the employees in the Colorado department of the American Smelting & Refining Co. below foreman, will receive a bonus at the end of each year of service. A similar plan has been in force for some time so far as the higher grades of employees are concerned.

A couple of organizers in the employ of the Western Federation of Miners were deported from Sunlight, a coal camp near Glenwood Springs, a few days ago. The principal properties in that vicinity are owned by the Colorado Fuel & Iron Co. and the Rocky Mountain Fuel Company.

It is authoritatively stated that the Western Pacific railroad (Gould system) will build northward from Los Angeles at once, the construction not being delayed until the line from Salt Lake City to the coast terminus is completed, and although the incorporation articles of a new company, organized for this purpose, have not yet been filed, it is understood that the necessary capital has been subscribed already.

Representative Martin of South Dakota has introduced a bill in Congress, which, if passed, will be of considerable importance to the mining industry. It provides for the establishment of scientific testing stations under the control of the Federal government in the different mining States, the same to be in charge of an expert geologist and a competent chemist.

Leadville. Dec. 14.

The last of the large pumps at the Penrose was installed during the week, and now at the 900-ft. station three large pumps—two compound and a triple-expansion—are at work and capable of raising 2,500 gal. water per minute, which is greatly in excess of the present inflow. It is now accepted by all interested in the down-town section that the water in this district is practically controlled, and that no further trouble is anticipated. It has cost the Western Mining Co. fully $250,000 to reach the present stage, but the amount of ore that is in sight will more than repay it for the heavy outlay. Drifting will at once be started toward the Coronado and also to the south; when the drift reaches the former, close to 1,000 ft., it will be fully 100 ft. deeper than the bottom of the shaft. An upraise will be made from the drift to connect the shaft, and water will be diverted toward the Penrose; the latter will be used as a pumping shaft for the properties owned by the company. When the drift reaches the Sixth Street shaft, about half way, it will be 300 ft. deeper. At present it is not the intention of the company to work this property, but after the drift reaches the Coronado the whole of the territory on the trend will be thoroughly prospected, to open up the extension of the Coronado ore-shoot; it is also expected to open this shoot to the south.

The strike recently reported at the Continental Chief, at the head of Iowa gulch, continues to improve as work on the vein progresses. Ore is now being shipped at the rate of 30 tons per day that runs from 90 to 140 oz. silver per ton, with a good average in lead; about the same amount of low-grade ore is being sent to the smelter. Preparations have been completed to continue work all winter, but it is doubtful if the roads will be kept open. In that event the ore will be stacked on the dump until the spring. Should this happen the force of men now at work will be put on development work and a large amount of ground opened for the spring campaign.

Last month the Moyer mine, belonging to the Iron Silver Mining Co., shipped 13,000 tons of ore; of which 10,500 tons was zinc, 1,500 tons iron sulphide, 500 tons copper and 500 tons lead carbonates. It is expected the output this month will reach 14,000 tons. The Tuscon shaft which is the extension of the Moyer to the east, is making good progress and the end of January should see the work finished. This shaft will open up a large body of ore. The character of the drill cores showed a predominance of zinc. This will give the company two properties that will be able to ship 26,000 tons of ore per month.

The death of August R. Meyer, president of the Yak tunnel, will in no way interfere with the work of the great bore. It is said on good authority that Mr. Meyer had his plans perfected for carrying on of the great work, and they will be carried out. At present the property is shipping 8,000 tons per month and from the mill fully 200 tons of concentrates are turned out daily. A number of parties owning property on Iron and Breece hills are driving laterals from the main tunnel.

A good body of ore was recently encountered in the Silver Queen, in Lake Park district, and during the week a carload of high grade was sent to the smelter; when the returns are received another car will be sent out. The character of the ore is silicious, carrying a good percentage of lead and about 50 oz. silver per ton. This property is about one mile east of the Ida May, that recently opened a 4-ft. vein of ore running well in gold.

A good strike was made in the Ready Cash, Iowa gulch, a few days ago, the ore running high in gold. About 150 ft. back in the tunnel a similar body of ore was encountered, but it proved to be only a pocket. The owners are now of the opinion that they have caught the main shoot and that the present strike will be permanent. The Ella Beeler, further up the gulch, is shipping a fair amount of good ore daily.

All of the iron properties carrying silver are shipping a heavy tonnage daily on account of the increase in the price of the metal. A number of claims that have been idle for several years are again getting into shape to resume work.

Salt Lake City. Dec. 17.

The White Pine Lead Co. is the name of a new company just organized to operate in the White Pine, Nev., mining district. It has a capital stock of $10,000, in $1 shares. Ernest Bamberger, of Salt Lake, is president.

In the State Line mining district, in Iron county, there is little evidence of activity at the present time. Only a few men are employed in the camp. It is believed, however, that the coming year will witness renewed interest. Several mining men, who have been active in the develpment of the districts of Tonopah and Goldfield, will make some investigations in the camp early in the new year.

The foundations for the new mill of the

Utah Copper Co., out near the new smelter town of Garfield, are almost completed, and the contracts for the steel buildings and equipment will possibly be let during the coming week. The bids, at least, will be opened. The new plant will not be ready for operation until late in 1906. Following the announcement of the taking over of the Utah Copper mine by the Guggenheim Exploration Co., an accessory of the American Smelters' Securities Co., the statement has been released which says the result of all the prospecting and development work has been to demonstrate beyond a doubt that there is now blocked out in the mines more than 20,000,000 tons of ore of a profitable grade. Above the main tunnel level, the average height of the developed ore is about 200 ft., and the area opened gives the tonnage stated, without figuring on a foot of ground beyond the working faces in the mine.

From now on it will be the policy of the company to discontinue developments, as there is enough ore now blocked out to last a long time. Hence, the operating expenses will be decreased. Shipments of high-grade crude ore from the All's Well vein will be inaugurated soon.

The Shawmut mill, at Bingham, will soon be in operation again, it having been decided by the management to start it off with custom ore. Later, the company will commence milling its own ore.

The Carbonate & Rattler property has been bonded to Salt Lake parties, and an effort will be made to open it again. The mine has produced considerable ore in the past.

Very rapid progress is being made with the construction of the new copper smelter of the Garfield Smelting Co., at Garfield, 17 miles west of Salt Lake City.

The Intermountain Electric Co., of which James J. Chambers, Atlas block, Salt Lake, is manager, has commenced the construction of a power plant in Little Cottonwood cañon, and will undertake to supply power and light to the surrounding mining camps. Before the close of 1906 a second plant will be built.

The mine owners of Bingham, who depend on the Copper Belt railroad for the movement of their ores, are still suffering great inconvenience on account of the breaking down of motive power, but conditions will be normal again within a week.

The Beck Tunnel Consolidated Mining Co., of Tintic, which has commenced dividend payments, had $12,000 in its treasury on Nov. 30, with two cars of ore in transit that would bring $1,000 a car. The management expects to furnish the market with four cars a week, and to keep up regular dividends. This company was reorganized about a year ago, when it took over the La Reine property. A new double-compartment shaft is to be started soon.

Butte. Dec. 17.

Amalgamated has resumed work in its Neversweat mine and is raising the customary quantity of ore from the levels daily. The mine was out of commission two weeks on account of a squeeze in the shaft between the 200 and 500 stations. The company is now operating all of its mines full blast and extracting an average of 10,500 tons of ore a day. Boston & Montana is shipping 50,000 tons a month to the Washoe plant because of inability to secure adequate transportation for its output to Great Falls and the fact that the wet product freezes on the way to the latter. These shipments will likely continue until spring.

United Copper is operating steadily and is maintaining its daily production of between 1,200 and 1,400 tons, which is coming principally from the Rarus, Cora and Minnie Healey mines. The Lexington is yielding some ore and the Belmont is also producing a small quantity of low grade. The company is buying ore from various small properties under lease.

A new company known as the South Butte has entered the field to compete with the North Butte and East Butte Copper. Its ground consists of a few lots in undeveloped territory south of the property of the Pittsburg & Montana.

Original Consolidated, or Clark, mines are being operated continuously, the daily output of ore at present being about 1,000 tons. The company expects to have its new converters in operation about Feb. 1 and will then make blister copper instead of high-grade matte. It does not intend to increase the production of ore or copper in 1906 over this year, but anticipates making a greater saving in mineral.

North Butte is now hoisting ore through its own shaft and is gradually increasing the output. This gives the Anaconda Co. an opportunity to increase the production of the High Ore mine, for it relieves the pressure on the hoisting machinery of that mine, which had to perform almost double duty during the time North Butte ore was being raised through the High Ore shaft.

Pittsburg & Montana is operating its mines and smelter steadily, the output of the latter being about 6½ tons of copper a day. The company values this product at $500 a ton, $200 of which is gold and silver. Operating expenses are placed at about $1,500 a day. Work in the new shaft is progressing rapidly, a depth of 60 ft. having been attained. A carload of copper was sent East yesterday and another will be loaded out the latter part of the week.

Calumet. Dec. 17.

An important strike has been made in the south ground of the Centennial. A rich stretch of copper-bearing ground has been opened in the drift south from No. 1 shaft on the twenty-first level. The drift has progressed farther to the south than any of the other Centennial openings. It came into the rich territory at a point 250 ft. from the Calumet & Hecla boundary and hence the find is important to that corporation. At a point a few hundred feet south of the boundary separating it from the Centennial, the Calumet & Hecla is sinking a shaft on the same bed. It is down only 250 ft., but the Centennial's disclosures show that excellent values may be expected at great depth. Owing to the great uncertainty regarding the exact course of the lode on its section 16 property, the Atlantic Mining Co. is confining its Baltic lode exploratory work at that point to the extension of the drift northward from No. 5 shaft of the Baltic mine at the sixth level. This drift has already progressed 250 ft. beyond the boundary between the two properties and there remains only 300 ft. for the drift to penetrate before reaching the strike line of the proposed Atlantic shaft. Work in the drift is progressing at the rate of 100 ft. a month. Barring unforeseen accidents, it will take only three months to reach the line of the shaft. As soon as that point is reached, crosscuts will be driven to locate the lode. Then it will be possible to ascertain the values in the Baltic bed at that point by extending drifts.

Duluth. Dec. 16.

The Cleveland Cliffs Iron Co. has given orders this week for two underground electric haulage systems, one for the Cleveland Lake, on the Marquette, and the other for the new Crosby mine, of the west Mesabi range. The latter is now being opened for mining on a considerable scale, and its proposed plant, if to be 100 h. p., permitting a large product. The mine is lean ore, but of good physical character and can be mined at little cost. It will be stripped and work has begun. Both these plants are to be furnished by the General Electric Company.

The Oliver Iron Mining Co. is taking up the problem of washing its western Mesabi ores, and a plant for the purpose is to be built very soon. Works are to be erected at the Canisteo mine, at Bovey, where development is now under way with three shafts in the orebody. This property will be a great shipper when conditions permit, and the experiments in the way of washing these ores will be watched with interest. While styled experiments the company has a very definite idea of just what it is doing, and knows in a general way that the washing problem is not so serious, after all. This company has just secured title to a half interest in the Walker lands, on the west Mesabi, in the vicinity of Bovey and Holman, where its developments are in progress. Some time ago a half interest in these lands was bought by the Great Northern road, for about $100,000, but it learned that the price paid now for the remaining half is

considerably higher. It is known that these tracts, which extend for several miles along the ore-bearing formation, contain a very large tonnage of the characteristic ores of that district.

Platteville, Wis. Dec. 14.

Fred Krog and associates have secured some 500 acres just south of Platteville, which is said to be one of the best tracts of mineral ground in this field. It is their purpose to thoroughly prospect the same. Mr. Krog is one of the original discoverers of the Empire mine.

It is quite interesting to note the number of new prospecting companies that are being organized each day. The majority of them are legitimate propositions, every one going in on the ground floor.

The Dubuque Ore Development Co. was recently organized for the purpose of prospecting for ore in the vicinity of Dubuque.

The Galena camp is finally coming to life, after a period of depression. Several former Joplin operators, who are making their headquarters at Platteville and Galena, have secured some good property in the vicinity of Galena, and will introduce several practical innovations not heretofore tried in this district.

One of the principal organizations at that camp recently is the King Solomon Mining Co. The property controlled is partially developed and will only need some additional machinery to prove same to the point of certainty.

Korgan & Keine, of Cleveland, Ohio, have leased a portion of the Seubert farm in the Galena camp, and propose to begin operation at once. Miners have been scarce, and it is their intention to import some men from the copper mines. They also propose to adopt the Joplin system of a weekly pay-day. The system heretofore has been to pay on the fifth of each month. A company of Michigan capitalists intends to begin prospecting on the Dingle property in the near future.

R. M. Churchman, representing Indianapolis capitalists who are heavily interested in the Frontier mine in the Benton camp and the King Bee in the Hazel Green camp, was in the district last week. The new concentrating plant at the latter place was started up and worked satisfactorily.

A company of 50 business men from Platteville has organized what is called the Peacock Mining Co. The work will be done on the Peacock farm near Big Patch; two drills will be started at once. All the stock was subscribed for in 30 minutes, such is the interest in zinc mining among the local people.

The Elizabeth camp was visited by a party of 40 mining men from Seneca, Kan., some of whom are heavily interested in the Skene mine, which is said to be the largest lead mine of its kind in the United States. The mineral occurs in large cubes and boulders weighing from 1,000 to 2,000 lb. in a nearly pure state. The Skene management recently obtained control of the old Wishon property. With modern machinery the Skene management expect to work the dirt that was passed over in former times and save all the values in the wash dirt.

The new Galena type roaster at the Tripoli mine will be started about the first of the year, under the new management and with the improved process of roasting and separating, the owners are looking forward to a production of from one to two carloads per day of 60% zinc ore.

Work will be resumed at the Edgerton mine at once. It is the intention of the managers to enlarge the present shaft and to lower same to the clay-bed, at which point the drill showed rich cuttings.

The annual meeting of the Klar-Piquette Mining Co. was held at Platteville, re-electing the old officers. The work of sinking the main shaft to the ore level is being pushed by the contractors. The installation of the large Cornish pump will be completed within three weeks.

All the operators, except the Phœnix and Platt, report that they expect to continue work during the winter. Extensive preparation in the way of steam heating and the enclosing of all machinery has been completed in most instances. The shut-down at the Platt is said to be only temporary, to enable the owners to sink their shaft to the lower run.

The Chicago & Northwestern is building spurs to the different mines along its line, in some instances going out five or six miles. It is reported that an independent steam line is figuring on tapping the several different camps, and it is a fact that the electric promoters are surveying the right of way from Galena to Hazel Green; from there they intend to continue north to Platteville.

Scranton. Dec. 17.

As a result of the Mine Workers' joint convention in Shamokin last week, the formulating of the demands to the operators will be in the hands of President John Mitchell and the Executive Committee. This has been one of the shrewdest moves yet made by Mitchell in his generalship of the anthracite miners. His admonition that conservative delegates be elected foreshadowed that efforts were to be made to avert any radical steps on the part of the convention, and the outcome is a guarantee that there will be no strike in April next. A resolution was adopted by the convention appointing a special committee, comprising President Mitchell, the district presidents and the executive boards of the three districts, to prepare the demands to be made to the operators. The committee will also submit these demands to the operators before another convention is called to approve them. In brief, the entire situation is in the hands of President Mitchell and his lieutenants. After the demands have been submitted to the operators and action taken, another joint convention will be called, when the results will be reported. It is safe to predict that the special committee will exert its utmost efforts to settle all difficulties in an amicable spirit.

There were some of the radical spirits in the convention, who made a protest against the alleged railroading of the resolution. These delegates had gone to Shamokin under the impression that the convention would be in session for another four or five days, and that the various demands would be discussed in detail. They had set speeches ready on the eight-hour and other questions. Instead of publicly discussing all the grievances, the resolutions were all turned over to the scale committee, which collected them and recommended that they be all referred to the special committee with power to act. The same delegates urged that the convention should go upon record in favor of specific demands, but they were not given any encouragement. The convention even decided that it would be wise for the delegates not to discuss the resolutions. The gathering was remarkable for its brevity, as well as for the manner in which it yielded to Mitchell's wishes.

There were two features which proved a surprise. President Mitchell vigorously denounced the Miners' Home, which is to be created under the act of the last legislature. A resolution was presented in favor of the home, when Mitchell left the chair and in the most indignant terms roundly denounced the legislature and the promoters of the act, with the result that the resolution was hastily withdrawn. He thought that as the miners were already contributing their share of the poor taxes, it was unwise to expect them to maintain the public poorhouse and an alms-house for the miners as well.

Since the adjournment of the convention a report has gained currency that the special committee will open negotiations contemplating the re-convening of the Anthracite Commission to make a new award binding upon the men and the operators for a term of years. The plan provides that a deputation of the miners and operators first meet and endeavor to arrange the basis of an agreement, and, in case of failure, to re-convene the commission. Should the plan be adopted, and it is said to be favorably regarded by the operators, Judge Gray, as chairman of the commission, will be invited to convene the meeting.

Another mining village, Richmondale, situated in the northern extremity of the field, has been abandoned, owing to the exhaustion of the coal supply in the Richmondale mine. The colliery was opened 13 years ago by the Elk Hill Coal Co.; it had the highest breaker in the country, a unique structure and one of the sights of the anthracite region. A steel tower was

built over the shaft, which was sunk some 200 ft. to two veins of coal, 7 and 8 ft. thick. The tower was connected with the breaker, 200 ft. away, by a steel chute supported on two intermediate towers, from which the coal gravitated to the large rolls. The steel tower was 187 ft. high and about 50 ft. square at its base. The loaded coal cars were hoisted 150 ft. above the surface, and by an automatic arrangement the coal was emptied from the car without running from the carriage. The property was acquired by the Scranton Coal Co. a few years ago, and as a result of the improved mining operations, the supply of coal was soon exhausted. The tower, breaker and about 50 houses are now being torn down, and the village will in a few weeks be no more.

It is probable that nothing more will be heard of the much discussed Shaleen mine certificate case, which it was said would be carried to the Supreme Court of the United States. That part of the act providing that all miners shall reside in Pennsylvania at least two years before sitting for a certificate was declared unconstitutional. That clause was regarded by the miners as their Gibraltar, inasmuch as it prevented the operators from bringing men from other States in the case of a strike. There is nothing now to prevent the operators from importing men, so that there would be no need upon their part to take an appeal, as they will, doubtless, be satisfied with the decision of the Superior court, annulling that clause. The right of appeal belongs to Shalleen and not to the Commonwealth nor the mine-workers, and under these circumstances, it is most improbable that he will take any further action in the matter, but will pay what fine the county court may impose and thus close the incident.

The Dickson breaker of the Delaware & Hudson Co. resumed operations on Monday, after being closed for four months for repairs. The tower has been rebuilt and is 25 ft. higher than the old one, while other extensive improvements have been effected.

Fire threatened the workings of the Green Ridge colliery, Scranton, on Friday, the blaze originating in a peculiar manner. The fire boss carried a naked light in his cap and the flame caught an old wooden buttress overhanging the Clark vein for the past 25 years. A dense volume of smoke came from the mine and about 3,000 ft. of hose had to be borrowed from the Scranton fire department to reach the scene of the fire. It was extinguished with little loss. The colliery is owned by W. L. Connell, president of the Conciliation Board.

Commissioner C. P. Neill reports an increase of 6% in miners' wages upon their earnings for the month of November. The average sellling price of coal was $4.84 per ton.

The Conciliation Board will meet in Philadelphia on Dec. 22.

The Lehigh Valley Coal Co. has pensioned a number of the employees who were discharged at the Coxe collieries.

Great interest has been manifested in the organization of the State Constabulary in pursuance of the act passed by the last legislature, as a result largely of the strikes in the coal regions. Instead of calling out the National Guard, as heretofore, the State Constabulary will be given the custody of the public peace, as well as substituting in a large measure the much-abused Coal & Iron Police. An effort was unsuccessfully made at the miners' convention to condemn the new organization, but it aroused little enthusiasm, as the miners bear less ill will toward the State Constabulary than the State militia. One of the four barracks is to be established at Buttonwood, a village just below Wilkes-Barre. The troop there will consist of a captain, a lieutenant, an orderly sergeant, and 50 troopers, all of whom will be mounted.

Indianapolis. Dec. 18.

A wave of prosperity is sweeping over the block coal fields of the Brazil district. The mines are now working full time. During the months of October and November the average was scarcely three days a week. A number of mines that were closed for some time are being reopened and preparations are being made for active winter work. The operators say the demand has been better and prices steadier this fall than in the last two years. The shortage of cars this fall, which seemed to be a serious drawback, is now known to have been a blessing in disguise, as the operators agree that had the cars been plentiful earlier in the season there would have been such quantities of coal produced that mining in this field now would be at a stand-still.

William Zeller, of the Zeller & McClellan Coal Mining Co., said he was satisfied that the railroad companies, now owners of the majority of the coal properties of the middle West, have been treating the independent operators with fairness.

On the other hand W. E. Eppert, of the Coal Bluff Mining Co., of Terre Haute, says, "the cause for the increase in coal prices is the inability of the railroads to furnish sufficent cars to handle the coal mined."

The action of the Indiana Coal Operators' Association, at a meeting held in Terre Haute, Dec. 12, on the railroad rate legislation question, leaves no doubt that railroad interests now have control of the Indiana coalfield. The resolutions are, word for word, the same that were put through the meeting of the Kentucky operators. They declare against legislation which will give a commission authority to make rates. The resolution were presented by President Ogle, of the Vandalia Coal Co. (Pennsylvania railroad property), and there was some opposition, led by J. Smith Tally, a large independent operator, who asked the operators to be conservative. He doubtless voiced the views of the small operators in the association, but the men representing the big merger companies carried the resolutions through.

A significant phase of the meeting of the Indiana Association was the small number of companies represented, as compared with former years. A year ago the association had a membership of 96 companies, and there were a number of operators who were not members. The merger companies have absorbed many of these companies, and now seven or eight men represent five times that number of a year ago. The 17 delegates selected to attend the Interstate joint conference were not instructed. There is very little apprehension felt by the bituminous operators of Indiana as to the outcome of the conference to be held in Indianapolis next month.

Toronto. Nov. 30.

At a meeting of the Canadian section of the Society of Chemical Industry, held Nov. 24, at the National Club, Toronto, Mr. Neighbour, manager of the Canadian Chemical Co., London, Ont., announced that in the spring a company would be organized to invest $1,500,000 in a plant to utilize the silver ore of Hastings county, Ontario, and to produce sulphuric acid by the contact process. It is understood that the plant will be located near Tweed.

An official report from the superintendent of mounted police at White Horse, in the Yukon territory, received at Ottawa, states that at Windy Arm a rich vein of silver ore has been discovered half a mile from the Montana tunnel. This proves the vein to be more than half a mile long and trebles the amount of ore in sight in the Conrad Consolidated group of mines, of which it forms one.

All the members of the Geological Survey staff who have been on field duty during the season have now returned, excepting Hugh Fletcher, who is working on the iron and coal deposits in the Maritime Provinces, and will remain in the field until the end of the year.

The Geological Survey of Canada has sent to the Duke of Argyle, who, when Marquis of Lorne, was Governor-General of Canada, a base of sodalite, to be used for a monument to the Duke's father. There are rich deposits of this stone in Hastings county, in the discovery of which the Duke was much interested. The stone forwarded was procured in the Princess quarries in Dungannon, by Chas. W. Willmott of the Survey.

T. W. O'Brien, of Dawson, has gone to England in the interests of the Klondike Mines railway, which was chartered in 1899 to run from Dawson to Stewart River Crossing, a distance of 84 miles. Some five miles have been laid with rails and ten miles graded, but progress has been

delayed owing to the number of mining claims staked out along the route, and more capital is required to overcome the difficulty. The line taps several very productive mines, including Bonanza Creek and Dominion Creek.

Victoria, B. C. Dec. 11.

East Kootenay.—The Crow's Nest Pass Coal Co.'s collieries report an output of coal during the month of November as follows: Coal Creek, 37,986 tons; Michel, 26,688 tons; Carbonado, 9,870 tons; total, 74,544 tons.

James Cronin, manager of the St. Eugene silver-lead mine at Moyie, is reported to have stated, on his return last week from Toronto, where he met the directors of the St. Eugene Consolidated Mining Co., that an effort is being made to consolidate the St. Eugene mining interests with those of the Canadian Pacific Railway Co.'s Canadian smelting works, at Trail, B. C. The directors of the St. Eugene Co. have agreed to support this consolidation proposal, and the decision of the owners of the Canadian smelting works is now awaited before further action can be taken. The St. Eugene mine is the largest producer of lead in Canada and the Canadian smelting works has so successfully operated the only silver and lead refinery in the Dominion that a considerable enlargement of its capacity has been made this year.

West Kootenay.—The Reliance Gold Mining & Milling Co., of Nelson, reports the discovery of a vein in its May and Jennie mine, near Nelson, on 40-Creek, the occurrence of which was quite unexpected. The orebodies heretofore explored in this mine are large but generally low grade. In treating them after milling, the Hendryx electro-cyanide process has proved suitable and effective in recovering the gold, which occurs in a free state. The gold values in the newly-discovered vein have thus far been found much higher than those previously obtained in the mine, assay values having ranged up to $60 to the ton. The extent of the ore of higher value has not yet been proved.

Cables received from London, Dec. 9, are to the effect that at a stormy meeting of 500 shareholders in the Le Roi Mining Co., the proposals of the directorate for amalgamation with the Centre Star and War Eagle mining companies, Rossland, and the Canadian smelting works, Trail, against which A. J. McMillan, late managing director and general manager, has for several months been carrying on an active campaign in England, were decisively defeated, only four out of a large show of hands having favored the policy of the directors. Sir Henry Tyler, chairman of directors, demanded a poll, which will be taken during the current month. A. J. McMillan, who had been ejected from the board by his late colleagues, was elected director in place of Geo. S. Waterlow, who sought re-election, and Messrs. Drayton, Dimmesdale and Wilson were also voted to the board. Mr. McMillan caused a sensation by stating that he had been offered £15,000 to give his services toward consummating the proposed amalgamation. John H. Mackenzie, who was appointed general manager after the directors dispensed with Mr. McMillan's services, had been summoned to London before the meeting was held, and W. H. Aldridge, chief of the Canadian Pacific Railway Co.'s mining and metallurgical department, was also in England, to support the amalgamation scheme recommended by the directors.

Boundary.—A recent important development at the British Columbia Copper Co.'s Mother Lode mine, situated near Greenwood, was the discovery that the orebodies at the 300-ft. level are much longer than had previously been thought probable. When, some time since, this level was driven the drift passed out of the big ore-shoot and was for about 50 ft. in barren rock, at which distance from the known orebody work was discontinued. Quite lately, as part of an extensive plan of prospecting with the diamond drill, a horizontal hole, bored at the 300-ft. level, at 18 ft. entered a shoot of ore which continued for about 130 ft. before the country rock was again encountered. The ore is a heavy sulphide of iron carrying values in copper, gold and silver, with sulphur much above the average of the general run of Mother Lode ore. This high sulphur content is of especial value in smelting Mother Lode ores, which, without heavy sulphide, are likely to produce matte of too high a grade for best results in recovering the values.

London. Dec. 9.

The Cassel Gold Extracting Co., of Glasgow, is about to change its name to the Cassel Cyanide Co. The directors are actuated to make this change by the fact that the company does not nowadays extract gold or own any patent rights connected with such processes, but occupies itself solely with the manufacture of sodium cyanide, working in harmony with the Castner-Kellner Alkali Co., which produces metallic sodium. It is probably considered too late now to change the "Cassel" part of the name, and perhaps most people have forgotten how this name ever became part of the company's title, seeing that it has been identified since 1887 with the MacArthur-Forrest cyanide process. The company was formed in 1884 to acquire certain patents from H. R. Cassel. Work and negotiations were conducted on an elaborate scale in England and various parts of the world, until suddenly Mr. Cassel found it more convenient to take up his residence abroad. It was then found out gradually that the process and apparatus were quite valueless. How it was that certain other chemists and engineers in the service of the company did not detect that there was something wrong with the process at an earlier date has always been somewhat of a puzzle. But, in the words of the opera, "we must consider their extreme youth and forgive them." Anyhow, afterward, the company acquired and developed the MacArthur-Forrest patents. The company had trouble also with these patents, but for a different reason. After the success of the process had been fully proved, the metallurgical world came forward and opposed the validity of the patents, alleging prior knowledge. This also was "hard lines." It is difficult to figure out the profits made by the original shareholders of the company, for many of the dividends were in the form of shares in subsidiary companies, but I doubt whether they ever got their money back. In 1898 the share capital was written down three-quarters, to £58,750, in shares of 5s. each. Since that time dividends amounting to 215% on the reduced capital have been paid, chiefly from profits made by the manufacture of cyanide. In addition to this profit a reserve fund of £46,000 has been built up. It is intended now to distribute £29,375 of this fund, and at the same time to ask shareholders to use this money for subscribing to 117,500 new shares of 5s. each. In this way, the reserve fund will become available for working capital, while giving all shareholders the personal option of saying whether they prefer cash or new shares. The company now holds a very strong position in the chemical and metallurgical world, and successfully holds its own against the severe competition of other makers of cyanide.

The Champion Reef Gold Mining Co., of India, is one of the most regular dividend payers among gold mines. During the year ended Sept. 30 last, the total dividends distributed amounted to £416,000, a sum identical with that of last year, and comparing with £405,000 during the year before. The company was formed in 1889 and commenced to pay dividends in 1894, when £70,000 was distributed. From that time the amount distributed has steadily increased until it has reached the present high figure. Altogether over £3,000,000 have been distributed as dividends. During the past year the stamps crushed 215,000 tons of ore, yielding 188,596 oz. of bar gold. The cyanide plant produced 25,589 oz. from 177,000 tons of tailings, and 2,617 oz. were obtained from the plates and from the old mill when dismantled. The total return of bar gold was 216,802 oz., which realized £825,263. The mill now consists of 220 stamps, which are all operated electrically. The developments at various parts of the mine continue good and the ore reserves on Sept. 30 were estimated at 378,000 tons, as compared with 419,000 tons a year ago. This is a slight decrease, but is explained by the fact that at one point, the vein, which was for a time in two parts and was worked from two points, has joined again.

General Mining News.

Tennessee Coal, Iron & Railroad Co.—At a meeting held in New York, Dec. 19, John W. Gates, C. S. Guthrie, L. C. Hanna, E. W. Oglebay, Grant B. Schley, S. G. Cooper, E. J. Berwind, and Oakley Thorne were elected directors of this company. The executive committee is now made up as follows: John W. Gates, C. S. Guthrie, Grant B. Schley, L. C. Hanna, E. W. Oglebay, D. H. Bacon, and S. L. Schoonmaker. The retiring directors were: James T. Woodward, John E. Borne, Benjamin F. Tracy, C. Meyer, J. H. Smith, Andrew Smith, H. L. Leroy, A. B. Boardman, and William Barbour.

Since the contest for control started a month ago, the price of the stock has advanced over 50 points. The regular quarterly dividend of 1% was declared. After the meeting, C. S. Guthrie, chairman of the board, gave out the following statement: "The new interests entering the board of the Tennessee Coal & Iron Co. are in absolute control of the property. We have bought control of the corporation with the object of developing it and bringing the property up to the highest degree of efficiency. Considerable money will be spent for extensions, improvements, etc. As to the merger of the Tennessee Co. with the Republic Iron & Steel Co., that is a question of the future."

Petroleum Exports.—Exports of mineral oils from the United States for the 11 months ending Nov. 30 are reported by the Bureau of Statistics as follows, in gallons:

	1904.	1905.
Crude petroleum	89,017,965	93,621,790
Napthhas	18,400,110	26,531,329
Illuminating oils	694,942.151	786,596,746
Lubricating oils	78,281,864	98,292,212
Residuum	31,899,920	59,496,233
Total	912,542,010	1,064,538,310

Paraffin is included in lubricating oils. The increase in the total exports was 151,996,300 gal., or 16.6%, this year.

Southwestern Coal Mining Rates.—The coal operators and superintendents in the various districts throughout the Southwest are holding meetings and formulating mining scales, to be presented to the miners at the coming joint convention in January.

ALABAMA.

FRANKLIN COUNTY.

Louisiana-Alabama Coal Co. — This company was recently organized with headquarters in New Orleans, S. B. McConnico, president. The company has bought 3,320 acres of coal land near Phil Campbell, in this county, and will begin work at once on its first mine opening.

CALIFORNIA.

CALAVERAS COUNTY.

Voinich.—A rich strike has been made on the 700-ft. level of this mine at Angels. The new 40-stamp mill is expected to start by the first of the year.

EL DORADO COUNTY.

Union Mine.—The owner of this property, A. Harpending is busily engaged in building a new mill to replace that of 40-stamps recently destroyed by fire.

Golden Gate.—At this mine (formerly the McNulty) near El Dorado, James Richards superintendent, preparations are being made to put up a 10-stamp mill and several buildings.

Pyramid.—The company owning this mine has put up a new hoist, and a rock-breaker of large capacity. The shaft is 500 ft. deep.

Sunnyside.—This drift mine near Grizzly Flat, owned by A. A. McDonald, has been bonded to Thos. G. Patton, of Placerville. The gravel is cemented and has to be milled.

HUMBOLDT COUNTY.

Herbert H.—The ditch for this placer mine at China Flat is completed, but some fluming is yet to be done. It is owned by James Henderson, Wm. Wagner and E. Beaulieu.

INYO COUNTY.

Bunker Hill.—This mine, near Big Pine, has been placed under bond and development work is being conducted by Mr. Gavin, the manager.

Cerro Gordo.—The grade on the road is being widened for operating a traction engine, which is to deliver 100 tons of ore daily at Keeler.

Beveridge District.—It is expected that work will shortly begin on the new road to this district, which will greatly benefit the mines.

Cecil R.—It is announced that work will begin soon on the mines of this company near Ballarat. There is a mill on the property.

MARIPOSA COUNTY.

Whitlock.—At this camp the Austin Co. and Jacob Teats have closed down their mines for the winter, owing to the difficulty of hauling ore. Extensive development work is being done in the Farmer's Hope by Stolder & Dussel. J. J. Nevills is running a crosscut to tap the vein on the Bonanza claim.

SAN DIEGO COUNTY.

The group of claims at Sacataro Valley, near Alpine, owned by Samuel Wettleson, has been sold to Salt Lake men, and a contract has been let by the new owners to complete the crosscut tunnel to the ledge.

SHASTA COUNTY.

Mammoth Copper Co.—This company at Kennett is now employing 250 men, and smelter No. 2 is running steadily, the plant now being of 500 tons daily capacity.

Great Western Gold Co.—This company is now employing 140 men and making extensive improvements. A kiln of brick has been completed for new furnace construction. The suit to have a receiver appointed has been stopped by the showing made by the company.

SIERRA COUNTY.

Forest City Mine.—This mine, in American Hill district, has struck the channel on the west rim rock and they are drifting to determine the direction and contour of the bed rock. The channel is mostly of quartz and is thought to be either the Emigrant or Nebraska channel. The company has been searching for these channels some eight or ten years. The old channels in these claims were worked many years ago, and it seems from the recent strike that they run into the Forest City ground.

South Fork.—Drifts are being run and breasts opened out at this mine, Forest City, preparatory to washing gravel as soon as there is sufficient water.

Columbia Channel.—Blue gravel has been struck in this mine, near American Hill. J. M. Harper, superintendent. It was found in a 70-ft. upraise at the end of the 1,800-ft. tunnel. The striking of gravel in this ridge is a good thing for the mines of gravel in that section, such as the Mabel Mertz, Mabel and New Monte Cristo properties.

New Independence.—This mine, better known as the French Ledge, has been bonded to W. H. Tuttle, of Grass Valley, and will be worked this winter. The mine is an old one, but has not been worked for some time. It is on Wolf Creek, near the Nevada County line.

SISKIYOU COUNTY.

Dredging Ground.—W. P. Hammon, of Oroville, has shipped two Keystone drills to Cottonwood Flats (Hornbrook P. O.) and with them certain ground supposed to be adapted for dredging will be prospected.

Adam Rule.—This river claim on the Klamath, near Gottville, will soon be started up again.

TRINITY COUNTY.

Fairview Mining Co.—In this mine, at Minersville, Chas. Dobler, superintendent, after passing through 1,450 of diorite, they have cut the slate formation in tunnel No. 4, so they expect to strike the ledge very shortly.

COLORADO.

BOULDER COUNTY.

Concord.—This group of mines, in the Sugar Loaf district, has been sold for a consideration of $100,000 to the Concord Mining & Milling Co., with Erie, Pa., and Boulder, Colo., capital interested. The property is known as a large low-grade proposition and the company will make arrangements for the erection of a 100-ton mill on its own mill-site, within a short haul from the Colorado & Northwestern tracks. W. J. Thomas, Boulder, Colo., is treasurer of the new company.

Sunshine District.—At the Boulder Valley mine here a new shaft-building has been erected and a steam plant of machinery is being installed.—The Inter-Ocean

Mining Co., with Chicago capital, is going to build a 50-ton cyanide plant this winter, to be completed by April 1.—The White Crow Mining Co. is installing a new Leyner steam plant of machinery. J. C. Miller is manager.—New York people are making arrangements to start up the Tillie Bartcel and are expected to run a tunnel to drain the property.—The Hope tunnel is being put in working shape and new buildings are to be put up and machinery installed by the owner, Mr. Clark, of Chicago; G. H. Pate being manager.

CLEAR CREEK COUNTY.

Georgetown Dividend Paying Leasing Co.—Georgetown people have organized this company, having taken leases in the Pelican property. L. W. Vidler, Georgetown, Ohio, is manager.

American Sisters.—A large body of ore carrying good silver values and 33% zinc has been opened, and manager J. J. White, of Georgetown, Ohio, is arranging for the erection of a 25-ton concentration plant.

Little Mattie.—In the seventh level, on what is known as the Pike-Rowe lease, ore has been opened up carrying high gold values. The ore is a copper-lead silver glance. Idaho Springs men are interested in the lease.

GILPIN COUNTY.

Ann Rutledge Gold Mining Co.—Youngstown, Ohio, people are interested in the erection of a 25-ton amalgamating and concentration plant at the North Star property in Vermilion district, a contract having been given to the Colorado Iron Works Co. for its construction. A. B. Sanford, 1617 Champa street, Denver, is manager.

Elk Park Mining Co.—Pittsburg and Cannonsburg, Pa., people are interested. A new shaft-building, 30 by 60 ft., has been erected and a steam plant of machinery is being installed on the Annie H. shaft. C. A. McNeil, Apex, is manager.

Forks & Randall Extension.—A lease and bond for two years, in sum of $18,500, has been given by Senator Teller and associates, on property situated in Nevada district, to Oliver Watson, of New York, and a plant of machinery is to be installed. E. C. Betts, Bald Mountain, Colo., is in charge.

Copper Jim.—A one-half interest in this property, in the Wisconsin district, has been sold for a reported sum of $25,000 by J. A. McCracken to J. B. Bramlett.

TELLER COUNTY—CRIPPLE CREEK.

Acacia.—A lively quarrel is still on between the two factions of the Acacia, each attempting to get control at the annual meeting in the latter part of January. Several circulars have been issued by both sides. It is reported that some of the rich ore-shoots of the Shurtloff property run into the Acacia ground. The only important work at present in progress on the mine is the sinking of the McKensie shaft on the south end, put down for the purpose of exploiting the Shurtloff ore-shoots.

Stratton's Independence.—It is currently reported that this company has bought the two cyanide mills of the Homestake Reduction Co. on Ironclad hill. This report, however, cannot be confirmed at present. The Homestake mills have been dry for some time.

Findley.—This property is being worked with considerable vigor and heavy production, and a large amount of ore is exposed.

Free Coinage.—Steady work is being done on the Casper shaft. The annual meeting of this company is to be held in a few days, but it is not supposed that any great change will be made in the directorate.

Banner.—The strike on this property, on Rosebud hill, still continues to be good. It is understood that several cars have already been shipped from it.

Hayden.—Much ore is being taken from the Hayden on the Gregory or Elkton Co. It is probably one of the best paying leases in the district at present.

IDAHO.

IDAHO COUNTY.

Crooked River Mining Co.—This company is working its property at Oro Grande on the open-cut system. The cyanide mill is being operated steadily. The mining and milling costs are reported to be very low.

ILLINOIS.

PEORIA COUNTY.

Kingston Coal Mining Co.—The ownership of this company has passed from the Peck estate to Richard Newsam, of Peoria, Ill. The price paid is said to be $250,000. The company owns 1,000 acres of land, 800 acres being coal land; two shafts having an output of 2,000 tons daily; a spur track 2¼ miles long; and a village for its miners.

INDIAN TERRITORY.

CHOCTAW NATION.

The car situation in the McAlister, Willinston and Hartshorne districts has greatly improved in the past two weeks, and plenty of orders are coming in, notwithstanding the recent advance in prices, and the prospects are for a good winter, unless it turns unusually warm.

Osage Coal & Mining Co.—This mine, near Krebs, which caught fire from a windy shot about three weeks ago and was sealed up to smother the fire, was opened last week and found to have still such a fierce fire in it that it was again sealed. It is not known when it will be opened again.

Rock Island Coal Co.—This company has just equipped its No. 5 mine at Alderson and No. 3 mine at Hartshome with Ottumwa box-car loaders with car-pulling attachments.

IOWA.

Iowa Coal Operators' Association.—At the annual meeting in Des Moines last week the reports showed that the work of the association had been successful in adjusting disputes. The delegates to the Chicago conference were continued, and authorized to attend the adjourned meeting in Indianapolis, for the purpose of forming a general association. The following officers were chosen for 1906: President, H. L. Waterman; vice-president, T. J. Phillips; treasurer, E. C. Smith; secretary and commissioner, John P. Reese. The Executive Committee named was as follows: First district, Alex. Dargavell; second district, B. C. Buxton; third district, S. W. White; fourth district, E. C. Smith; fifth district, Sam McClure. The Scale Committee selected includes the following members: H. L. Waterman, John P. Reese, Alex. Dargavell, Tom E. Lee, B. C. Buxton, Henry Phillips, S. W. White, W. A. Durfee, E. C. Smith, Edward Gray, Sam McClure, H. H. Canfield and B. A. Johnson.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Baltic.—Only three heads are in commission at the stamp mill at Redridge. Each is equipped with auxiliary crushing rolls, and the mine's production is larger than when all four heads were operating without rolls. The fourth head will be placed in commission on Baltic rock after No. 2 shaft goes into commission, probably six months hence.

Calumet & Hecla.—Sinking in No. 21 shaft, on the Kearsarge amygdaloid, will be resumed shortly. The new engine is in place and the boiler installed. As soon as the new shaft-house is completed development work will be resumed.

Erie-Ontario. — Crosscutting from the bottom of the 100-ft. shaft has reached the lode sought. The formation has been penetrated 20 ft., and the crosscut will be driven to the hanging wall. Then drifting will be started along the hanging wall. It is still uncertain whether the formation is the Baltic amygdaloid.

King Phillip.—The permanent organization of this company has been completed in Boston by the election of directors and officers to take the place of those chosen at the first meeting, in Houghton. The directors are Nathaniel Thayer, George P. Gardner, Walter Hunnewell, Charles J. Paine, Jr., Nathaniel H. Stone and Arthur G. Stanwood, of Boston; Rufus R. Goodell, of Houghton. The officers are: Arthur G. Stanwood, president; George P. Gardner, vice-president; Edward B. O'Connor, secretary and treasurer.

Union Copper, Land & Mining Co.—This concern is not engaged in active development work itself, but is benefiting from the work on lands adjoining its properties. It has contributed 160 acres

to the Erie-Ontario, and 240 acres to the Miskwabik, in Keweenaw county. It owns an extensive area of undeveloped lands in various portions of the district.

Winona.—Development work is being pushed at seven different points. Sinking is under way in both No. 2 and No. 3 shafts, and drifting is under way on five levels. The fourth level drift south has been in good ground for the last 100 ft. The sixth level drift south has revealed better ground than any exposed above.

ONTONAGON COUNTY—COPPER.

Adventure Consolidated.—No. 4 shaft, which was started last summer, is producing to a slight extent, though only 100 ft. deep. The shaft is a half-mile from the Copper Range railway, and 80 tons of rock a week are hauled in sleighs to the tracks.

Aztec. — Exploratory work on this tract, under option to W. L. Stannard, of Greenland, and C. D. Hanchette, of Hancock, is under way, eight men being employed. The overburden is only 3 to 4 ft. thick, and the Knowlton lode has been uncovered at a number of points.

MONTANA.

LEWIS & CLARKE COUNTY.

Bald Butte Mining Co.—All work at the mine of this company, near Maysville, has been discontinued, with the exception of two contracts, one on the 500 level, where a drift on one of the old veins is being run to cut a new cross-vein which was discovered on the 600 level in new territory and carries the highest values yet found on the latter level. Nothing of value has ever been found below this tunnel level. The other contract is in a crosscut from the bottom of the shaft at the 1,000-ft. level, or the 400-ft. below the 600 tunnel level.

The reason for the shut-down, which includes the mill plant, as given by officers of the company, is to conserve the treasury fund, which is below $20,000. An engineer will be kept at the power-house operating the electric plant, and a hoisting engineer at the shaft, where an electric hoist serves the two men at work on the 1,000 level.

It was generally supposed that, on the strength of developments made during the summer and fall, the mill would drop 20 stamps all winter, with the expectation of materially strengthening the cash reserve.

John Larsen, who owns the bulk of the tailing from this mine, has made arrangements for a test cyanide plant, to go in early in the spring. There are some 250,000 tons of tailing in the dams, from which a nice profit should be realized.

NEVADA.

LYON COUNTY.

Nevada Consolidated Copper Co.—The statement filed by this company on listing its stock on the Boston Stock Exchange, gives the capital stock authorized as 1,300,000 shares, of $5 par value. Of these, 960,000 shares are listed on the exchange. Of the 340,000 unissued, 40,000 shares will be used to complete the plant, 100,000 shares for the extension of the plant, and 200,000 shares to convert railway bonds. The officers of the company are: James Phillips, Jr., president; Homer Loring, vice-president, and George G. Beals, secretary and treasurer. The balance sheet shows: Capital issued, $4,800,000; reserve, $71,775; total liabilities, $4,871,775. The assets are: Mine property, $3,404,250; Nevada Northern railroad, $1,001,000; development and equipment, $188,825; cash and cash assets, $277,700; total, $4,871,775.

OREGON.

BAKER COUNTY.

Gold Coin.—Sensational reports continue to come from the Gold Coin mine, in the Burnt River district, 22 miles southeast of Baker City, where a ledge was uncovered a few weeks ago, rich in free gold. The owners of the property, which consists of half a dozen claims, are pushing work vigorously, developing their main ledge with a view to establishing machinery on the property in the spring. They have taken out enough free gold ore to make a considerable showing, and pay some expenses of development work. There are streaks of rich quartz through the main ledge.

Bonanza.—Manager Al. Geiser, of the Bonanza mine, who is now the lessee of this property, in the Greenhorn district, some 45 miles west of Baker City, reports that he now has over 30 men at work, and that the output of the mine is increasing satisfactorily. Ore is being taken from the upper levels abandoned by the owners some time ago.

Highland.—The Highland, in the Rock Creek camp, 26 miles west of Baker City, now has 20 men at work, and three four-horse teams daily hauling concentrates from the new mill to the shipping station at Haines, for the Everett smelter. The new orebody in the main tunnel is proving to be of greater value than was first estimated.

Morning.—In the Morning mine, in the Greenhorn camp, the vein has been cut in the lower tunnel, and is larger and carries higher values than where previously exposed.

Double Eagle.—The lessees of this mine, adjoining the Belcher group in the Greenhorn camp, has just finished milling with satisfactory results.

Belcher & Golden Gate.—All the outside work has just been finished on this group, the property of the Daines Mining & Milling Co. in the Greenhorn camp. Lagging and sufficient timber has been laid up for use in the additional 1,200-ft. drift to be made on the Belcher vein, to tap the Golden Gate in its lower workings. President Geo. W. Daines is now in the East, but is expected here soon to make preparations for the installation in the spring of the new 20-stamp mill, which is waiting at the railroad station to be transferred over the snow to the mine. The lumber is at hand for the mill building.

PENNSYLVANIA.

ANTHRACITE COAL.

Lehigh & Wilkes-Barre Coal Co.—At No. 20 colliery of this company, on Dec. 13, the hoisting record was broken, 1,315 cars of coal having been raised.

Reliance Coal Co.—This company is sinking a shaft at its Upper Pittston colliery, to replace the slope which has been in use for many years.

Lehigh Coal & Navigation Co.—A movement is reported among the stockholders, to drop Lewis A. Riley, long president of the company. It is charged that a change is desirable for many reasons.

Dodson Coal Co.—This company has purchased the property of the Mt. Hope Coal Co. in Pottsville. The company owns the colliery at Morea and another at Kaskawilliam, and, it is expected, will make extensive improvements in the property recently acquired.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Eleventh Hour Mining Co.—John Madill, of Deadwood, general manager of this company, reports opening up a good body of ore on the Magnet claim, owned by this company west of Ragged Top. A new shaft has been sunk 100 ft. on the Balmoral claim. The company has a 200-ton cyanide mill nearly completed.

Victoria Mining Co.—The following board of directors was elected by this company: A. B. Smith, A. C. Smith, W. M. Glass, of Omaha, Neb.; A. J. Malterner, Deadwood, and M. B. Carpenter, St. Paul. The officers are A. B. Smith, president; A. C. Smith, vice-president; A. J. Malterner, treasurer; J. C. Carson, Deadwood, secretary; W. M. Glass, managing director. The company will start its 200-ton cyanide plant on Iron creek about Jan. 10.

Independence Mining Co.—This is a new company organized to develop a property adjoining the Branch Mint mine in the Galena district. The officers are: H. W. Groshong, Galena, president; E. R. Gates, Minneapolis, vice-president; J. A. Burrichter, Deadwood, secretary; Charles Cotton, Deadwood, treasurer; Mike Katen, Deadwood, director.

PENNINGTON COUNTY.

Blue Lead.—The formation in the new shaft has changed to solid ore, carrying a fair grade of copper. The company is encouraged and will sink a shaft 700 ft. to intersect the main tunnel.

Bullion.—James Hartgering, who has a

contract for building the bullion mill at Keystone, has finished his plans and estimates. The excavation will be finished Jan. 1.

American Tungsten Co.—R. J. Truax, general manager of this company, has returned to Hill City from Cleveland, Ohio. The new hoist, pump plant and camp buildings have been completed at the mine between Keystone and Hill City, and the old Grizzly Bear sawmill has been purchased and installed.

UTAH.

BEAVER COUNTY.

Newhouse Mines & Smelters.—Manager Lee Hanchett has announced that mining by means of steam shovels will be inaugurated at that property about Feb. 1. The ore delivered to the mill has been brought up to 700 tons a day.

Majestic.—Recent development in the Gomer shaft of the Harrington & Hickory lead mine are satisfactory.

SALT LAKE COUNTY.

Columbus Consolidated.—An order has been placed with the General Electric Co. for a 400-h.p. generator which will double the capacity of the company's power plant, near Alta.

Utah Copper.—This Bingham company has ordered another mine locomotive.

New England Gold & Copper.—The mill of this company, at Bingham, is being operated with two shifts. Mine development is showing well.

SUMMIT COUNTY.

Little Bell.—This company has begun the construction of a 500-ton ore-bin preparatory to starting regular shipments.

VIRGINIA.

CHESTERFIELD COUNTY.

Salisbury Coal Co.—This company has sold its property, consisting of 1,585 acres of land, near Midlothian, for $25,000. The purchaser is H. D. Eichelberger, of Richmond, who is understood to represent the Ginter estate. That estate owns nearly all the coal lands in the old Clover Creek basin.

WASHINGTON.

FERRY COUNTY.

Republic Consolidated Gold Mining Co.—In 1901 this company made three promissory notes to the Republic Exploration & Cyaniding Co. for $40,000, one being for $10,000 and the other two for $15,000 each. These were assigned to the Merchants' Bank of Canada. Suit was brought in 1903, and Nov. 13, 1905, a default judgment was entered in the U. S. Circuit court, at Spokane, Wash., in favor of the plaintiff. The termination of this suit is another step toward the winding up of the company's business, and it is believed in Republic that work will soon be resumed in the Republic mine.

Pearl Consolidated Mining Co.—Assessment No. 8, of 2 mills per share, has been levied. The main shaft is down 60 ft. and may have to go 30 ft. deeper before striking the vein. It will be sunk to a depth of 100 ft., where another level will be opened for exploitation of the Lone Pine vein, at a total depth of 190 ft. below the upper tunnel level.

Ben Hur.—Shipments of ore continue on an average of 20 tons a day.

Daisy.—Work has been resumed on this mine, situated 20 miles southeast of Kettle falls, east of the Columbia river.

Acme.—A tunnel was driven toward the vein three or four years ago. A bond has been given to Eastern people, under whose management work will be resumed as soon as possible.

WEST VIRGINIA.

BARBOUR COUNTY.

Messrs. Bowman Bros. and W. W. Rainey, of Philippi, have sold 7,000 acres of coal lands near Belington. The purchasers are understood to be from New York.

Midland Coal & Coke Co.—This company, which owns a large coal area on the west side of the Tygarts river valley, near Arden, has commenced preliminary work for the development of the tract. Four hundred coke-ovens will be erected in connection with the mines.

MARSHALL COUNTY.

Glendale Coal Co.—This company's property has been sold to W. H. Koch, of Wheeling and associates for $250,000. The transfer includes mines, tipples, miners' houses and a tract of 1,500 acres of coal land. It is stated that operations will be suspended for a time pending improvements and repairs to the plant, after which it will employ an increased number of men. The mine is on the main division of the Baltimore & Ohio railroad and the Ohio river branch. Shipping facilities by water will also be had.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA.

Platinum Discovery.—Charles F. Law, of Vancouver, writes us as follows: "It may interest your readers to know that a discovery of platinum has been made in place, on Bear creek, a tributary of the Tulameen river, in British Columbia. Baker & Co. report that a sample of ore, sent to them for assay, contains approximately 4 oz. platinum per ton. This sample was taken by myself from an ore-shoot 4 ft. wide in a fissure vein. This was sampled by Thomas Kiddie, manager of the Crofton smelter, in British Columbia, and was found to contain: Copper (wet), 1.38%; silver, 20.83 oz.; gold, 2.64 oz. per ton 'from wall to wall without selection.' The presence of platinum was not suspected, although the vein occurs in a known platinum district; and the same belt of rock in which the vein occurs has yielded platinum where eroded by the Tulameen river. The gangue is quartz, the ore itself being pyrite, pyrrhotite and chalcopyrite, in schist close to the granite.

"I was led to have this ore assayed for platinum by an article which appeared in your JOURNAL some time ago, referring to platinum values having been found in the nickel-copper ores of Sudbury and the copper ores of the Rambler mine, Wyoming. This goes to show the value of disseminated knowledge."

AFRICA.

RHODESIA.

The gold production reported for October was 33,383 oz. bullion, being 2,402 oz. less than in September. For the 10 months ending Oct. 31 the total was 337,774 oz. bullion, an increase of 124,319 oz., or 58.2%, over last year. The bullion reported was equal to 300,619 oz. fine gold, or $6,213,795 in value.

ASIA.

INDIA—MYSORE.

Kolar Goldfield.—The output reported for November was 51,906 oz. bullion; for the 11 months ending Nov. 30, it was 573,499 oz. bullion, against 570,998 oz. in 1904; an increase of 2,501 oz., or 0.4%. The bullion reported this year was equal to 516,149 oz. fine gold, or $10,668,800 in value.

AUSTRALIA.

NEW SOUTH WALES.

The gold yield of New South Wales for November amounted to 33,913 oz., as compared with 37,087 oz. during the same month last year. The output for the eleven months of the present year totals 300,979 oz., as against 284,582 oz. for the first eleven months of 1904.

EUROPE.

BELGIUM.

The production of the Belgian blast-furnaces for the 10 months ending Oct. 31 was 1,120,472 metric tons; an increase of 31,588 tons over last year.

GERMANY.

Pig-Iron Production.—In the month of October the German blast-furnaces made 1,006,943 tons of pig iron. This is the largest monthly output ever reported; it is 53,163 tons more than in September. For the 10 months ending Oct. 31 the total production was as follows, in metric tons:

	1904.		1905.	
	Tons.	Per cent.	Tons.	Per cent.
Foundry iron,	1,532,919	18.3	1,559,335	17.4
Forge iron....	687,742	8.2	666,183	7.4
Steel pig.....	515,606	6.1	568,127	6.3
Bessemer pig,	337,607	4.0	351,665	3.9
Thomas pig ..	5,325,618	63.4	5,825,229	65.0
Total.....	8,399,492	100.0	8,970,539	100.0

The increase in foundry iron was 26,416 tons; in steel pig, 52,521 tons; in bessemer iron, 14,058 tons; in Thomas, or basic, pig, 499,611 tons; while there was a decrease of 21,559 tons in forge iron. The total increase was 571,047 tons, or 6.8%. The total for 1905 will probably be close to 11,000,000 tons.

Coal Trade Review.

NEW YORK, Dec. 20.

ANTHRACITE.

The hard-coal market continues to grow in strength, fluctuating only with the temperature. Car supply has not improved, and dealers are still figuring how to meet their demands; the smaller sizes are particularly scarce, but the prepared sizes are in sufficient supply. The results of the miners' convention at Shamokin have been to place the entire responsibility upon Mr. Mitchell; a complete report will be found in the letter from our Scranton correspondent, an another page.

Prices on domestic and small sizes remain firmly fixed at the following quotations: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley f. o. b. New York harbor shipping points.

BITUMINOUS.

Demand for soft coal along the Atlantic seaboard continues strong; production is limited only by car supply. This is variable, but in spite of it, great quantities of coal are being moved during this mild weather. All the consuming territories are absorbing all coal sent to them, and it is believed that consumption along the Atlantic seaboard is larger this year than ever before, and that, notwithstanding the heavy tonnages coming forward, stocks on hand for particular purposes are not as large as was supposed.

The far East is absorbing large amounts of coal as fast as it reaches there, and demand continues strong, with orders still accumulating in the hands of shippers. Trade along the Sound is calling for more coal than is provided in the contracts, and some buying for this territory in the open market is probably going on. Trade in New York harbor is a little quieter, this point appearing to be the only weak one in the trade. The current prices have dropped to $2.75@$2.85 f. o. b. New York shipping points. All-rail trade is exceedingly active, and the demand for coal to be shipped in this way is as strong as ever. Producers adopt the method of adding to the price in order to keep down the demand for rail shipments; $1.50@$2 f. o. b. mines, according to quality, is now being asked. Car supply is limited and variable, though transportation continues good, so that shippers can calculate closely on the time of their arrivals.

Vessels in the coastwise market are short of demands, and they are taking advantage of this fact to insist upon the loading and discharging clause in their charters. Shoal-water New England ports are now closed for the winter, but rates on large vessels from Philadelphia remain as quoted last week. New York charges, 65@70c. to around the Capes.

Receipts and shipments of coal at Lake ports are given by the Bureau of Statistics as follows, for the 10 months ending Oct. 31:

	Receipts.	Shipments.
Anthracite	2,552,250	2,663,423
Bituminous	8,016,511	9,504,785
Total	10,568,761	12,168,208

As compared with 1904, there was a decrease of 214,036 tons in receipts, and an increase of 431,819 tons in shipments. Included in the shipments are 1,537,843 tons loaded for consumption of vessels.

Shipment of coal coastwise by water from Atlantic ports are reported by the Bureau of Statistics as below, for the 10 months ending Oct. 31:

	Anthracite.	Bituminous.	Total.
New York	12,254,277	7,202,780	19,457,057
Philadelphia	1,696,471	3,307,245	5,003,716
Baltimore	205,258	2,313,940	2,519,198
Newport News	.....	2,315,833	2,315,833
Norfolk	.....	2,042,752	2,042,752
Total	14,156,006	17,182,550	31,338,556

There was a total increase of 3,545,530 tons, or 12.8%, this year.

Rail shipments of coal from Ohio mines for the 10 months ending Oct. 31 are reported by the Ohio Coal Traffic Association as below, in short tons:

Railroads.	1904.	1905.
Hocking Valley	3,183,291	2,976,201
Toledo & Ohio Central	1,637,646	1,281,646
Baltimore & Ohio	1,366,334	1,660,502
Wheeling & Lake Erie	1,934,407	2,163,374
Cleveland, Lorain & Wheeling	1,362,822	1,702,672
Zanesville & Western	784,133	817,605
Toledo Division Penn. Co.	1,591,862	1,494,502
Lake E., Alliance & Wheeling	276,590	630,953
Total	12,137,085	12,727,455

The total increase was 590,370 tons, or 4.8%, this year.

The Chesapeake & Ohio Railroad Co. reports its coal and coke traffic for the four months of its fiscal year from July 1, to Oct. 31, in short tons as follows:

	1904.	1905.	Changes.
New River	1,738,677	1,752,395	I. 13,718
Kanawha	715,089	860,324	I. 145,235
Kentucky	32,708	29,601	D. 3,107
Connecting lines	48,860	133,894	I. 85,034
Total carried	2,535,334	2,776,214	I. 240,980

Of the coal originating on its own lines this year, 1,099,716 tons went west, 393,348 tons were shipped east, and 1,149,256 tons were sent to tidewater.

Coke tonnage during the same periods was:

	1904.	1905.	Changes.
New River	62,534	100,142	I. 37,608
Kanawha	10,693	37,009	I. 26,316
Connecting lines	543	3,144	I. 2,601
Total coke	73,770	140,295	I. 66,525

Of the tonnage originating on its own lines this year, 64,375 tons went east, and 72,776 tons west.

Birmingham. Dec. 18.

Coal producers are doing everything they can to hold up the production in this State through the month. Shipments are equal to the production, the railroads doing better than was expected in the way of handling the traffic.

The coke supply in this State is not up to all needs. There is yet much coke being brought into the district. The construction of new ovens will be rushed during the coming year, plans being in hand for no less than 350 new ovens during the first half of the year. The Southern Steel Co., a merger of the Alabama Steel & Wire Co. and Underwood Coal Co., will erect 300 ovens at the Virginia mines, and in addition to this will sink a new slope with double tracks and the latest machinery.

Chicago. Dec. 18.

General depression characterizes the coal market, on account of the mild weather, and also the increase in shipments due to the slackening of the car shortage. Buying of both anthracite and bituminous is on the hand-to-mouth basis; the market will not improve until there is a greater immediate need of coal. Both consumers and retailers are counting on the prospects of continued mildness, with the belief that as soon as needs become great, they can be readily supplied. This condition causes anxiety by wholesalers, in view of the short supplies everywhere and the railroad condition. When coal is needed it will be needed in a hurry—that is the general opinion of the trade.

Western coals, which have been most affected by the car shortage, are in good supply now, with the result that prices are fast going back to the depressed conditions of last autumn, before the car question arose. Lump and egg are quoted now at $2.50@$2.75; run-of-mine, $1.85@$2.15, and screenings, $1.30@$1.75. Domestic sizes are in much less demand than early in the month, while steam grades continue somewhat weak.

Eastern coals share in the conditions due primarily to the weather. Smokeless is weak as regards prepared sizes; run-of-mine is said to be scarce and brings as last week, $3.25@$3.55; lump and egg are quoted on sales at $4.15@$4.80. Hocking is easier, though there has been considerable coal on track that sold at a sacrifice, on account of demurrage charges, in the last week; quotations on Hocking are still $3.50@$3.75. Supplies of this coal are coming in plentifully now, considering the mild weather.

The anthracite trade is fairly good, for the season, but chestnut is scarce, and wholesalers anticipate a large demand on their stores as soon as the weather shall require more coal for immediate use. Stocks of retailers and consumers are known to be generally low. Free anthracite, that sells for 10c to 25c. less than the established prices, is still in the market to a considerable extent. Chestnut coal is most in demand, with supplies short, both in dock stores and by all-rail supplies.

Cleveland. Dec. 19.

Prices on coal are steady, but no relief from the car shortage has appeared. Prices on steam coal here are still $1.50 at the mine for run-of-mine in the middle dis-

trict, while Pennsylvania coals are selling at $1.30@$1.35 at mines. The railroads have not been able to get enough coal to keep them supplied and have been forced to continue confiscating commercial coal, which is restricting the supply on the open market. The situation is such as to cause a strong market for the product, with a shortage of the supply. Slack is also strong. Middle district or No. 6 slack is now selling at $1.25 at mines, while Pennsylvania slack is selling at $1@$1.15 at the mines.

A few straggling boats are still engaged in carrying coal to the head of the lakes, but the last of them will be in by Christmas. The last rates paid were $1 to the head of the lakes.

Some uncertainty is seen in the domestic coal situation, due to the interference of the natural-gas trade. The Massillon Association has announced a 25c. advance, making the price of selected lump $2.25 at the mines. But there is some delay in putting this into effect, due to the natural-gas competition.

Coke is still strong, but the market is comparatively dull. Prices have not changed, holding at $4 at the oven for spot shipment on the best grades of 72-hour foundry coke and $3.90 for the same on contract. Furnace coke is selling at $3 to $3.25 per ton.

Pittsburg. Dec. 19.

Coal.—The market is unusually strong, and prices are firmly held on the basis of $1.30 a ton for run-of-mine at the mine. Most of the railroad mines are in operation this week and all of the river mines are running. For the first time in many weeks there has been no complaint on account of a scarcity of cars. The supply has been almost up to requirements, but it is not known how long this condition of affairs will continue.

Connellsville Coke.—There was a large gain in both production and shipment last week, and the price of furnace coke is firmer. For prompt shipment $2.90 a ton is quoted. One sale of 14,000 tons was made yesterday for delivery in December and January at $3, which is the minimum rate for the first quarter. Foundry coke is still quoted at $3.50 a ton for any delivery. The production for the week is given at 283,522 tons and the shipments amounted to 12,016 cars distributed as follows: To Pittsburg and river points, 4,357 cars; to points west of Pittsburg, 6,414 cars; to points east of Everson, 1,245 cars. The combined shipments from the Connellsville and Masontown fields amounted to 359,264 tons.

San Francisco. Dec. 14.

Mr. J. W. Harrison's circular of this date says: "Since our last there have been two cargoes of Australian coal received; total, 7,340 tons. There are three vessels fully due from Newcastle, and seven vessels already afloat. The chartered list from Australia calls for 24 vessels, with a carrying capacity of about 68,000 tons. Four steamers have been chartered to carry coal to this port. In all, 17,769 tons of Colonial coal were delivered here last month; for the same month 1904, 29,874 tons arrived here from Newcastle. A total of 36,427 tons of British Columbia coal was delivered here last month. The coal deliveries at this port during the present year will be fully 30% less than the quantity received here in 1904; this does not signify that our manufacturing interests have shrunk to that extent, as the deficit has been more than made good by the increased consumption of fuel oil. The demand for household coals has largely increased this month, caused principally by the short spell of frosty weather, hence the stocks on hand have been materially diminished. The steamer cargoes recently arrived from Australia have come to a good market, as immediate delivery from steamer-side was taken by consumers at full prices. Wholesale prices for all grades of fuel remain unchanged; British Columbia products dictate current values; all shipments from that section are now made by steamers, at fairly good rates of freight, provided generous deliveries are taken from steamer-side on arrival here."

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wellsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Dec. 20.

Exports of fuel from Great Britain, with the coal sent abroad for the use of steamers engaged in foreign trade, are reported as below, in long tons:

	1904.	1905.	Changes.
Coal	42,461,143	43,463,534	I. 1,002,391
Coke	688,551	685,296	I. 3,255
Briquettes	1,143,073	1,034,257	I. 108,816
Total	44,292,767	45,183,087	I. 890,320
Steamer coal	15,749,865	15,972,120	I. 222,255
Total	60,042,632	61,155,207	I. 1,112,575

There was an increase of 1.8% in the total fuel consumed beyond the limits of the United Kingdom. The exports to the United States, included above, were as follows for the 11 months:

	1904.	1905.	Changes.
Atlantic ports	30,108	52,544	I. 22,436
Pacific ports	75,036	75,160	I. 124
Total	105,144	127,704	I. 22,560

There was an increase of 21.5% this year, chiefly in shipments to Atlantic ports; but the total quantity is small.

Iron Trade Review.

New York, Dec. 20.

Conditions in the iron and steel market are unchanged. The end-of-the-year lull is on, and until January we may look for a comparatively easy trade. This does not mean that there is nothing doing; only that buyers are holding back as far as possible. In some lines this is not very far. Plates and structural material, for instance, continue in strong demand. New bridge and building projects are looking for material in large quantities; and to this has been added a call from lake shipbuilders, who have orders to replace the vessels destroyed by the great November storm on the Lakes, as well as their previous orders for new boats.

There are reports of negotiations for rails for export. It is said that these will go through, if the mills can find place for them.

There are also reports that offers have been made abroad for pig iron and steel billets for import to the United States. At present no definite facts can be ascertained, and the probability is that such negotiations are rather of the tentative order.

As announced in another column, the Tennessee Coal, Iron & Railroad Co. is now fully under control of the Gates party. This probably means a consolidation with the Republic Iron & Steel Co. later; but nothing definite is given out as yet on that point.

Pig Iron Production.—The reports of the furnaces on Dec. 1 show that there were in blast on that date 289 stacks, including all the anthracite and coke, but not the charcoal, furnaces. The total weekly capacity of these furnaces was 474,700 tons, an increase of 14,250 tons over Nov. 1. The *Iron Age* estimate of coke and anthracite iron for November, with an addition for charcoal iron, gives a total production of 2,046,500 tons for the month.

Birmingham. Dec. 18.

Quietness still prevails in the Southern pig-iron market, though inquiries being received would indicate that the buying movement will soon start up again. The quietness can be credited to the holiday season. The furnace companies in the Birmingham district are making efforts to deliver as much iron as possible. The railroads are doing well. The report of the Alabama Car Service Association for the month of November shows a gain of 11,478 cars handled by the railroads compared with November, 1904.

No. 2 foundry is quoted between $14 and $14.50 per ton, though no sales of any consequence are being reported at

either figure. No. 1 foundry is still given at $15 per ton.

The talk in this district has been during the past week in regard to a merger or a friendly relationship between the Tennessee Coal, Iron & Railroad Co. and the Republic Iron & Steel Co. Messages given out to the labor that there would be no wholesale changes no matter what followed, are taken as a definite announcement.

Directors of the Sloss-Sheffield Steel & Iron Co., who spent a week looking over the properties of the company in this district, have returned to their respective homes well pleased. It was given out that the Sloss-Sheffield Co. was not seeking any merger with any other company nor was there a majority of the stock for sale on the market. It is announced here that at the meeting in New York, this week, Joseph Bryan, of Richmond, Va., will resign. His successor as first vice-president will be M. N. Richley, now assistant general superintendent of the Southern railway. Mr. Richley will have charge of all mining and outside work.

Chicago. Dec. 18.

Sales of pig iron and iron products continue as good as can be expected for the middle of the last month of the year. There have been no large purchases, neither has there been any weakening of prices. On account of the end of the year, the approach of the holiday season and the general filling of orders that will supply the needs of foundrymen for the coming three months at least, business is quiet.

Orders for pig iron at present are mostly for small lots, needed to make whole immediate requirements. There is little disposition to contract ahead six to eight months, or to buy in large quantities. Southern iron is being chiefly sold for this purpose, most of the Northern furnaces being tied up for their full product on contracts.

Prices continue the same as last week—$14.50 Birmingham, or $18.15 Chicago, for Southern on general contracts, and $19.50 for Northern No. 2 iron. There is a range of 50c. above or below these quotations, as regards special conditions, but the bulk of the business is done at the prices named. Lake Superior charcoal brings $19@$19.50—a little less than last week.

The market for iron products and manufactured shapes is very good, with no signs of weakening anywhere. Railroad supplies continue active, and sales of structural material are satisfactory to the trade.

Coke is more plentiful and prices bid fair to drop, though sales are still said to be at $3.25@$3.50 ovens, or $5.90@$6.15 Chicago. Increased supplies and no corresponding increase of consumption account for the situation.

Cleveland. Dec. 19.

Iron Ore.—Shippers have contracted with the vessel interests for the transportation of ore during the season of 1906 on the same basis as last season, namely, 75c. from the head of the lakes to Lake Erie ports, 70c. from Marquette, and 60c. from Escanaba. The amount covered is said to be about 10,000,000 tons. This is independent of the amount of ore to be carried by the fleets owned by the steel companies. All told, arrangements have been made for the transportation of upward of 25,000,000 tons. This indicates the belief of vesselmen that the movement for 1906 will be a little over 30,000,000 tons, regardless of the fact that sales have been heavier.

Pig Iron.—The market is dull, buyers holding off for the present, hoping to reduce the price. Spot iron is being obtained now from the Southern furnaces, which are charging $14.50, Birmingham, for No. 2. Northern prices hold nominally at $18 in the Valleys for the first half, with buyers disposed to look for lower prices a little later on.

Finished Material.—Three more boats were ordered this week, each one demanding 4,000 tons of rolling-mill products. The boat business is extremely heavy, and the demand for steel consequently stiff. The Eastern mills which have been furnishing structural iron in this market during the past few months are now getting well filled up with orders, and the buying here is restricted to the amounts which can be furnished by the jobbers. Plates are strong, occasionally commanding premiums. Billets are almost off the market with a strong demand, forging quality selling as high as $35, Cleveland. Bessemers are sold at $30@$32, Cleveland. Sheets are strong at the new price, a surprise to the trade.

New York. Dec. 20.

Pig Iron.—In foundry iron, there has been less active buying, and comparative quiet is expected until the end of the year. Quite a demand for basic iron developed, and several orders were placed.

Pig-iron prices show little change. For Northern iron, in large lots, we quote: No. 1X, $19@$19.25; No. 2X, $18.25@$18.75; No. 2 plain, $17.75@$18.25; gray forge, $16.50@$17; Virginia foundry is held at $18.60@$19.10 for No. 1, and $18.10@$18.60 for No. 2. Basic has been $18.25@$18.75 for Alabama, and 25c. less for Northern. For Southern iron, on dock, quotations are: No. 1 foundry, $18.75; No. 2, $18.25; No. 3, $17.50; No. 4, $17; No. 1 soft, $18.75; No. 2 soft, $18.25; gray forge, $16.50. Southern prices are firm, and a little extra is asked for special deliveries, especially of No. 2 soft.

On the Produce Exchange, the business in warrants is dull. Latest quotations, January delivery, are $16.50 bid, $16.75 asked, for regular warrants; $16.75 bid, $17.10 asked, for foundry warrants.

Cast-Iron Pipe.—Prices are steady on a basis of $28.75 per net ton for 6-in. pipe, carload lots at tidewater points. All the foundries are full of work.

Bars.—Business is good and higher prices are expected. Iron bars are 1.795c., tidewater, for plain, and 1.895c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25@2.50c. the current price, but premiums are asked on special deliveries.

Plates.—Steel plates are still in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are paid.

Structural Material.—Orders continue to come in, chiefly for small lots. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery. Premiums are asked on most ordinary business.

Steel Rails.—No change in standard sections. Light rails are in demand, prices ranging from $26 for 35-lb., up to $33 for 12-lb. rails.

Old Material.—Demand is moderate, but prices are firm. No. 1 railroad wrought is $22@$23; No. 1 yard wrought, $21@$22; machinery cast, $14@$15; heavy steel melting scrap, $18@$18.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Dec. 20.

Pig Iron.—A moderate volume of business has been done in foundry and forge iron with inquiries for large quantities of basic and some business in basic. It is stated on good authority that there are negotiations pending for large lots of basic for delivery during the next six months. The rumors are afloat that negotiations will soon close for a good deal of pipe iron and that offers have been made for foundry iron to Virginia and Alabama makers which will result in business if the prices suit. The tone of the market is very strong. Further rumors are rife relating to pending transactions for pig iron abroad. Quotations for No. 1 foundry are $19@$19.50; No. 2X foundry, $18.50@$19; No. 2 plain, $17.50@$18; gray forge, $16.50; basic, $18; low phosphorus, $24@$24.75; bessemer, $19.50@$20.

Steel Billets.—Considerable trouble is experienced in obtaining deliveries of steel contracted for two months ago, but the manufacturers are promising to keep their engagements on all deliveries after January. Ordinary steel is quoted at $30, or at least this is the official price, and open-hearth steel ranges from $3 to $10 higher, according to composition.

Muck Bars.—Muck bars sold this week at $29 at mill for puddled bars.

Bars.—The reports from nearly all of

our eastern Pennsylvania mills lead to the belief that work is crowding in even a little faster than two or three weeks ago. All orders taken for early delivery still command a premium. Steel bars are quoted at 1.63½, but this price is only nominal.

Sheets.—The sheet people have very little to say. The store demand has fallen off both in the city and country stores, but supplies are being hurried from the mills, it being the intention of the storekeepers to carry larger stocks.

Pipes and Tubes.—The demand for tubes is not so urgent, and it is stated that the mills are more wiling to meet buyers of large lots on more favorable terms. Pipes are quiet at present, but the mills have an abundance of work on hand.

Merchant Steel.—The buyers of merchant steel are purchasing in a very retail way. The consumption of this grade of steel appears to be increasing in this territory.

Plates.—The plate situation is as tense at it has been for three months. Nearly every plate mill has entangled itself with engagements for the delivery of large quantities during the first half of the coming year. The smaller buyers are now being heard from almost a month sooner than usual and they are willing to pay the highest prices for what they can get.

Structural Material.—Material for terminal facilities for railroads have been contracted for this week for several thousand tons; a lot of 20,000 tons is wanted by the New York Central; the American Bridge Co. has recently made a number of contracts for construction which will drive it into the market and some large engineering firms have loaded up with a lot of private work which will force them to contract during January for large supplies, the total of which, including terminal work, will greatly exceed 100,000 tons, if the statements of our office people are to be relied upon.

Steel Rails.—An interesting, and to some people an alarming, feature of the rail situation is the unexpected uncovering of large requirements for rails for countries outside of the United States. The magnitude these requirements is stated by a railmaker to be somewhere between 50,000 and 100,000 tons. Several large lots are now going through the preliminary negotiations.

Old Material.—The holders of old steel scrap scarcely know what price to ask for it, and some of them will have an opportunity of looking at it for a while before selling it. Steel scrap of all kinds is wanted, but consumers do not need it as badly as they did a month or two ago. Low phosphorus scrap would be taken at $23.50; railroad scrap is still wanted at $22.50; yard scrap is worth about $20; machinery scrap is held at $16.50; other kinds are about the same as heretofore quoted.

Pittsburg. Dec. 19.

Some important pig-iron deals are pending and may be closed within the next few days, and will involve large tonnages of bessemer iron for deliveries in the first half. Negotiations also are on for a round tonnage for second-half shipment. Besides the United States Steel Corporation, two large steel interests are in the market. It was reported today that one concern has closed a contract for 25,000 tons of bessemer for the second half at $17, Valley furnaces. While the name was not given, the interest is believed to be the Lackawanna Steel Co. It is known that this company is in the market and is negotiating for first-half iron and may buy, the price to be subject to monthly adjustments. A similar arrangement, it is said, will be made by the Steel Corporation, which has abandoned its policy of buying monthly and may place orders with the Bessemer Pig Iron Association and W. P. Snyder & Co. for bessemer iron aggregating about 200,000 tons. The Cambria Steel Co. recently bought 60,000 tons of bessemer and basic iron for delivery in the first half. When the Corporation closes its deal there will be very little bessemer iron available for the first half. The minimum price for all iron contracted for is $17, Valley furnace, and indications point to a higher rate after the opening of the year.

Ferro-manganese continues scarce and a firm offer of $150 a ton was made this week, but without success. Several sales of small lots were made within the past week at $125 a ton. The Carnegie Steel Co. has been a heavy purchaser of spiegeleisen and ferro-manganese in the past three weeks, and has contracted for about 25,000 tons for future delivery, the bulk of it being spiegeleisen.

There is no change in the steel market, new buying of finished products being very light. The scarcity of steel continues to interfere with the plans of the American Sheet & Tin-Plate Co. to operate all of its mills. The Star and Monongahela plants in this city were scheduled to resume last week, but did not get started, as it was impossible to get the steel. It is reported today that the leading interest will shortly order an advance in the price of tin-plate, but that sheets will remain at the present price. The largest independent tin-plate plant, which has been operating irregularly owing to the difficulty in obtaining the steel required, is expected to go on in full after the first of the year. The outlook for the tin-plate trade seems to be brighter than for sheets. The big interest was operating 85% of its capacity at the opening of this week. There is talk of an advance in the price of plates this year or early next year, but there does not seem to be any reason for the advance as the plate mills are practically sold up for next year. The structural mills also are crowded with business and the Carnegie Steel Co. has not been in a position for some time to promise deliveries before the third quarter. There is more activity in the steel-bar market due to the difference in the price compared with iron bars. Merchant-steel bars are still quoted at $1.50c., while the Republic Iron & Steel Co., the leading producer of iron bars, adheres strictly to its quotation of 2c., Youngstown, equal to 2.04¾c., Pittsburg. Some eastern iron bars are offered at 1.90c. delivered Pittsburg, but western bars seem to be preferred here. The car supply for finished material last week was not entirely adequate, but the tonnage offered was enormous. A decision has not yet been reached as to the suspension of the mills for the holidays, but it is likely the Homestead and Edgar Thomson works will close on Saturday and resume on Tuesday morning. Some of the plants in this district that are in need of repairs likely will close for one week.

Pig Iron.—Recent sales of bessemer pig iron for delivery next year aggregate over 100,000 tons. Negotiations are pending, which when closed will increase this tonnage by from 200,000 to 300,000 tons. The price of bessemer for prompt shipment is $17.50, Valley furnaces, and sales for the first quarter have been made at $17. Basic iron is a trifle weaker and is quoted at $17.25 for this year. The foundry and gray forge market is quiet. No. 2 foundry is quoted at $18.35, Pittsburg, and gray forge at $17.10@$17.35, Pittsburg.

Steel.—There is but little change in the steel market. One lot of 1,000 tons of bessemer billets was sold at $26, which is the minimum price. Open-hearth billets are quoted at $27@$28, and sheet-bars are nominally $27. Merchant-steel bars remain at 1.50c. and plates at 1.60c.

Sheets.—Considerable new business has been placed and the market shows signs of improvement. Prices are firmly maintained. Black sheets are quoted at 2.30@2.35c., and galvanized at 3.35c. for No. 28 gauge.

Cartagena, Spain. Dec. 2.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 4,200 tons manganiferous ore to Great Britain; one cargo, 3,300 tons dry ore, to Baltimore. The strong position in the local iron ore market as recently reported by us continues. Prices continue firm, and higher figures are looked for in the future for any little mineral that has not been already contracted. There are at present registered in the Province of Murcia 3,843 mines. Freight rates continue firm.

Quotations for iron ores show little change. Ordinary 50% ore is 7s. 8d.@8s.; special low phosphorus, 8s. 2d.@8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% managanese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

London. Dec. 9.

The exports of iron and steel, and of machinery, from the United Kingdom for the 11 months ended Nov. 30 are valued by the Board of Trade returns as below:

	1904.	1905.	Changes.
Iron and steel	£25,474,233	£29,153,627	I. £3,679,394
Machinery	19,139,360	21,140,838	I. 2,001,478
New ships	4,052,498	5,157,187	I. 1,104,689
Total	£48,666,091	£55,451,652	I. £6,785,561

The exports of mining machinery, included in the totals, were valued at £806,087 in 1904, and £764,644 in 1905; a decrease of £41,443. The chief items this year were: South Africa, £249,937; Australia and New Zealand, £94,186; India, $38,147; South America, £33,313.

The chief items of the iron and steel exports were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	752,561	946,769	I. 194,208
Wrought iron	157,813	169,271	I. 11,458
Sheets	348,578	371,496	I. 22,918
Plates	140,696	188,239	I. 47,543
Rails	474,663	510,192	I. 35,529
Steel ingots, etc	112,843	140,770	I. 27,927
Tin plates	318,867	330,197	I. 11,330
All other kinds	668,578	777,132	I. 108,554

Exports of pig iron to the United States were 51,385 tons in 1904, and 162,762 tons in 1905; an increase of 111,377 tons.

Exports of tin-plate to the United States were 64,294 tons in 1904, and 59,786 tons in 1905; a decrease of 4,508 tons. The total increase in quantities, including all kinds, was 350,933 tons, or 15.2% this year.

Imports of iron and steel and their manufactures into Great Britain for the 11 months were valued as follows:

	1904.	1905.	Changes.
Iron and steel	£7,586,880	£7,628,411	I. £41,531
Machinery	3,982,339	4,192,670	I. 210,331
Total	£11,569,219	£11,821,081	I. £251,862

The chief items among the iron and steel imports were the following, in long tons:

	1904.	1905.	Changes.
Pig iron	120,839	114,100	D. 6,739
Wrought iron	96,108	90,981	D. 5,117
Steel ingots, etc	491,122	532,136	I. 41,014
Structural steel	116,357	106,128	D. 10,229
All other kinds	371,525	358,721	D. 12,804

The total increase in quantities was 6,115 tons, or 0.5%, this year.

Imports of iron ore for the 11 months were: Manganiferous, 257,837; straight iron ores, 6,428,965; total, 6,686,802 tons. The total in 1904 was 5,556,746 tons, showing an increase of 1,130,056 tons, or 20.3%, this year. Of the imports this year 5,232,958 tons were from Spain.

Heavy Chemicals and Minerals.

New York, Dec. 20.

The general tone of the market for heavy chemicals is quiet but firm. In some instances the market seems to be a waiting one, apparently delaying action till after the new year. Some items show distinct advances, which, as a rule, are not shared by all products.

Sulphur.—This shows no change from our last report. With prices practically the same, the market is steady. We give herewith the prices for the American product. Sicilian is quoted the same for Atlantic ports as the Louisiana product.

The monthly report of Emil Fog & Sons, Messina, under date of Nov. 30, takes a decidedly despondent tone for Sicilian sulphur, in view of slowly declining exports (24,481 metric tons for Oct., as against 26,127 for Oct., 1904); though the exports to the United States in Oct., 1905, were larger than in Oct., 1904 (5,100 and 2,331 tons, respectively). But general tendency of exports to the United States is toward a minimum; and even Sweden and Norway absorbed only 271 tons, as compared with 3,031 tons in Oct., 1904. This last slump is due to the substitution of pyrite for sulphur in the Scandinavian peninsula.

Pyrite.—This continues unchanged and in steady demand, the production being constantly absorbed (mostly for acid used by the fertilizer makers). Most of the foreign supply comes from Spain and Newfoundland. Pyrite cannot be used to advantage in making "sulphite pulp" for paper, sulphur being employed for this purpose. The total iron and copper pyrites imported to the United States from Europe and Newfoundland during Nov., 1905, was 43,015 tons. This included the ports of New York, Philadelphia, Baltimore, Mobile, Gulfport, Savannah, Charleston, and Wilmington.

Nitrate of Soda.—This shows the same prices, with a waiting market which is reported as quiet but strong. No stocks accumulate, the market absorption being ready and complete on the usual basis of long-time contracts. Greater activity is expected with the new year.

Salt Cake.—This is quoted at 65c. per 100 lb. on contract for carload lots. The *heavy alkalies* (carbonates and caustic) show a sustained demand.

Sulphate of Copper.—This reports another decided advance (20c. per lb.) probably in sympathy with the noted advance of the metal. The price is given herewith.

Tin Crystals.—These are quoted at 21c.—1c. below last month. *Tin bichloride* is reported at 10¼c., a slight advance (¼c.) over last month.

Phosphates.—Phosphate companies report the same situation, as noted hitherto and recently. It is just about a "a stand off" between buyer and seller. Actual prices are the same as those last quoted, and the market is firm. We discontinue, for the present, quotations, on foreign supplies (Algerian, Tunis, Christmas Isle, Ocean Isle, Somme, etc.), as the firms handling these report very small importations, the demand being met by the domestic supply. It is probable that part of the dullness is due to the season, and that greater activity may come with the new year.

PRICES.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb.		$4.75
38°, 100 lb.		5.25
40°, 100 lb.		5.50
42°, 100 lb.		5.75
Oxalic acid, com'l, 100 lb.		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb.		$5.75@$5.90
Nitrate of Soda, 100 lb.	96%	2.25
" " "	95%	2.22½
Sulphate of Ammonia, per 100 lb.		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain. or Europe
Sulphur.		
Louisiana, New York, Boston or Portland	ton	$22.25
Philadelphia or Baltimore	"	22.75
Pyrite.		
Domestic, furnace size	Unit	11c.
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines " "	"	9½@10c.
" furnace size	"	11½@12c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

*Fla., hard rock	$7.75@8.00	$10.90@12.10
land pebble	4.00@4.25	7.95@ 8.65
†Tenn., 78@80%	4.60@4.65	10.52@10.92
78%	4.00@4.25	.....
75%	3.65@3.75	.....
68@72%	3.25@3.50	.....
‡So. Car. land rock	4.00@4.25	.....
river rock	3.75@4.00	.....

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

British Chemical Trade.—Exports of chemicals from Great Britain for the 11 months ending Nov. 30 are reported as follows, in cwt. of 112 lb.:

	1904.	1905.	Changes.
Copper sulphate	1,356,000	1,099,020	D. 256,980
Sulphuric acid	109,439	78,801	D. 30,638
Muriate of ammonia	71,047	91,267	I. 20,220
Bleaching materials	722,286	897,036	I. 174,750
Soda ash	1,224,359	1,381,113	I. 156,754
Bicarb. soda	309,988	394,397	I. 84,409
Caustic soda	1,237,169	1,383,312	I. 146,143
Soda crystals	195,595	184,322	D. 11,273
Soda sulphate	847,062	686,250	D. 160,812

Exports of coal products—not including dyes—were as follows, in cwt.:

	1904.	1905.	Changes.
Aniline and coal tar oils	424,608	819,690	I. 395,082
Carbolic acid	123,863	121,581	D. 2,282
Napthaline, etc	93,170	90,024	D. 3,146
Other sorts	8,195,031	8,196,367	I. 1,336

Exports of superphosphates and other chemical fertilizers were 398,396 long tons in 1904, and 524,970 tons in 1905; an increase of 126,574 tons.

Imports of chemicals into Great Britain for the 11 months were as follows, in cwt.:

	1904.	1905.	Changes.
Borax and borates	329,153	215,735	D. 113,418
Potash nitrate	252,854	171,078	D. 81,776
Soda compounds	280,931	331,375	I. 50,444
Bleach	217,246	212,588	I. 4,658

The imports of fertilizing chemicals, of sulphur and of iron and copper pyrites valued chiefly for their sulphur contents, were as follows, in long tons:

	1904.	1905.	Changes.
Phosphates	382,014	387,741	I. 5,727
Nitrate of soda	110,023	94,672	D. 15,351
Sulphur	17,746	18,891	I. 1,145
Pyrites	657,052	620,348	D. 36,704

Metal Market.

New York, Dec. 20.

Gold and Silver Exports and Imports.

At all United States Ports in Nov. and Year.

Metal.	November.		Year.	
	1904.	1905.	1904.	1905.
G'ld Exp	$20,813,443	$1,137,318	$107,709,000	$44,125,935
Imp	4,727,105	5,171,141	81,467,050	46,514,475
Exc	E. $16,086,338	I. $4,033,823	E. $26,241,950	E. $2,388,540
Silv. Exp	3,405,566	5,631,819	46,020,584	49,316,963
Imp	2,439,742	4,272,581	28,834,087	30,930,532
Exc	E. $965,844	E. $1,089,238	E. $32,186,497	$18,386,421

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending December 16, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$14,230	$85,099	$860,968	$22,493
1905	34,633,733	10,774,770	33,729,905	4,114,960
1904	102,699,301	7,208,510	34,566,340	1,140,653
1903	31,866,867	18,974,227	31,654,026	3,267,818

Imports for the week, both gold and silver, were from South America, the West Indies and Mexico. Exports of gold for the week were to the West Indies; of silver, chiefly to London.

Exports of merchandise from the United States in November are valued by the Bureau of Statistics of the Department of Commerce and Labor at $170,297,885; showing increases of $15,923,938 over the total for October, and of $12,229,228 over November, 1904. For the 11 months ending Nov. 30 the statement is as follows:

	1904.	1905.	Changes.
Exports	$1,306,055,481		$1,427,223,207
Imports	939,342,431		1,078,481,024
Excess, exports	$366,723,050		$348,742,183
Add excess of exports, silver			18,386,421
Total			$367,128,604
Deduct excess of imports, gold			2,388,540
Total export balance			$364,740,064

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Dec. 16 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,060,057,700	$1,004,564,000
Deposits	1,096,117,500	983,888,500
Circulation	42,780,500	53,060,700
Specie	211,142,600	174,219,100
Legal tenders	77,433,400	75,714,100
Total reserve	$288,567,000	$249,933,200
Legal requirements	274,029,375	245,972,125
Surplus	$14,546,625	$3,961,075

Changes for the week this year were increases of $692,800 in specie, and $2,428,000 in legal tenders; decreases of $11,756,000 in loans and $8,347,200 in deposits. The deficit of last week is replaced by a small surplus reserve this week.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars.

	Gold.	Silver.
New York Associated	$174,219,100	
England	162,752,075	
France	577,007,905	$217,575,440
Germany	155,135,000	81,715,000
Spain	75,060,000	113,735,000
Netherlands	33,013,500	30,276,500
Belgium	16,463,335	8,231,665
Italy	134,345,000	15,872,500
Russia	576,215,000	18,205,000
Austria	224,690,000	60,095,000

The returns of the Associated Banks of New York are of date Dec. 16, and the others Dec. 15. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

The movement of gold in Great Britain for the 11 months ending Nov. 30 was as follows:

	1904.	1905.
Imports	£30,053,554	£36,376,387
Exports	29,937,659	27,084,930
Balance imports	£ 115,895	£9,291,457

The movement of silver in Great Britain for the 11 months ending Nov. 30 was as follows:

	1904.	1905.
Exports	£12,070,567	£13,055,500
Imports	10,552,728	11,752,396
Excess exports	£1,517,839	£1,303,104

This shows a decrease of £214,735 in the net exports. Of the imports this year £8,590,158, or 73.1% of the total, were from the United States.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell's as follows, for the year to Dec. 7:

	1904.	1905.	Changes.
India	£9,167,768	£6,268,421	D. £2,881,347
China	424,723	879,113	I. 454,390
Straits	79,268	38,299	D. 40,969
Totals	£9,671,759	£7,203,833	D. £2,467,926

Receipts for the week were £148,000 from New York. The exports were £297,100, all to India.

Silver has remained firm with fair Eastern demand. At present price dollars can be attracted from Mexico, and considerable amounts have already been sold. India having taken during the current year materially less silver than in the previous year, it is not unreasonable to expect a continuation of purchases by the government, so that the outlook is for continuation of current prices, though the key of the situation rests largely with the attitude of the Mexican government.

SILVER AND STERLING EXCHANGE.

Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
14	4.85¾	63⅝	30 5/16	18	4.85¾	65½	30¼
15	4.85¾	65⅛	30 5/16	19	4.8635	65⅛	30¼
16	4.85⅞	65⅛	30 5/16	20	4.8625	65⅛	30 5/16

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver, .925 fine.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.50¼	$0.51
Peruvian soles and Chilean pesos	.46	.48
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

December.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
14	18⅛ @18¾	18¾ @18¾	80⅝	36½	5.35	6.50 @6.55	6.35 @6.40
15	18⅛ @18¾	18⅛ @18¾	80¼	36½	5.35	6.55 @6.60	6.40 @6.45
16	18⅛ @18¾	18⅛ @18¾	....	36¼	5.35	6.55 @6.60	6.40 @6.45
18	18½ @19	18⅜ @19	79⅛	36½	5.35	6.60 @6.65	6.45 @6.50
19	18⅛ @19	18⅜ @19	79¼	36⅜	5.35	6.60 @6.65	6.45 @6.50
20	18⅛ @19	18⅜ @19	79⅛	36⅜	5.35	6.60 @6.65	6.45 @6.50

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipment in 50-ton lots, or over.

Copper.—While a fair amount of business was done during the latter part of last week, the beginning of this week was marked by a falling off in the demand, although prices have continued firm, and with even a stiffer tendency for the nearer deliveries. At the close the market is rather dull, and the quotations are nominal at 18½@19c. for Lake copper, 18⅜@19c. for electrolytic in cakes, wirebars or ingots, and 18⅛@18⅝c. for casting copper.

The standard market, after at one time touching £80 12s. 6d. for spot and £80 for three months, has since developed a reactionary tendency, and the close is steady at £79 2s. 6d. for spot and £78 17s. 6d. for three months.

Statistics for the first half of the month have decreased 200 tons. Refined and manufactured sorts we quote as follows: English tough, £80 15s.; best selected, £82; strong sheets, £90; India sheets, £85; yellow metal, 8¼d.

Imports of copper and copper material into Great Britain, with exports—including re-exports of foreign metal—are reported as below for the 11 months ending Nov. 30, in long tons; the totals giving the contents of all material, in fine copper:

	1904.	1905.	Changes.
Copper ore	71,674	84,896	I. 13,222
Matte and precipitate	59,838	59,342	D. 496
Fine copper	81,502	64,712	D. 17,790
Total imports copper	119,588	102,873	D. 16,715
Exports	45,870	47,828	I. 1,958
Re-exports	9,105	12,326	I. 3,221
Total exports	52,975	60,154	I. 7,179
Balance	66,613	42,719	D. 23,894

Of the imports this year 490 tons ore, 4,588 tons matte and 26,619 tons fine copper were from the United States; against 188 tons ore, 4,294 tons matte and 44,736 tns fine copper last year.

Exports of copper from New York for the week are reported at 2,862 long tons. Our special correspondent reports the exports from Baltimore for the week at 2,181 long tons of fine copper.

Tin.—Business in this article continues active and the scarcity of spot metal is making itself more and more felt, owing to the non-arrival of new consignments. The market closes firm at 36¼@36½c.

The London price has advanced further and the market closes firm at £165 for spot and £164 2s. 6d. for three months. It is reported that tin consumption abroad is also very heavy.

Imports of tin into Great Britain, with re-exports of foreign metal, for the 11 months ending Nov. 30 are reported as follows, in long tons:

	1904.	1905.	Changes.
Straits	28,710	30,491	I. 1,781
Australia	3,851	3,709	D. 142
Other countries	2,225	1,946	D. 279
Total imports	34,786	36,146	I. 1,360
Re-exports	25,121	26,757	I. 1,636
Net imports	9,665	9,389	D. 276

In addition to the re-exports, the exports of British tin were 5,457 tons in 1904, and 7,077 tons in 1905; an increase of 1,620 tons.

Lead.—The American Smelting & Refining Co. is billing its current shipments at 5.35 New York, and 5.27½c. St. Louis.

The London market showed some weakness during the week, at one time declining to £16 17s. 6d., but the close is somewhat firmer at £17 for Spanish lead, and £17 1s. 3d. for English.

Imports and exports of lead in Great Britain for the 11 months ending Nov. 30 are reported as below, in long tons:

	1904.	1905.	Changes.
United States	33,544	22,918	D. 10,626
Spain	101,540	95,887	D. 5,653
Australia	68,028	66,827	D. 1,201
Germany	15,205	18,793	I. 3,588
Other countries	7,563	3,772	D. 3,791
Total imports	225,880	208,197	D. 17,683
Exports	32 289	38,703	I. 6,414
Balance	193,591	169,494	D 24,097

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Dec. 2, that silver has been 15 reales per ounce. Exchange has been 32.09 pesetas to £1. Local quotation for pig lead has been 82.50 reales per quintal; equal, on current exchange, to £14 7s. 7d. per long ton, f. o. b. Cartagena. Shipments for the week were 300 tons desilverized to London; 211 tons argentiferous and 200 tons desilverized lead to Marseilles.

Spelter.—It would seem that the stocks on hand have been entirely absorbed. There is a fair inquiry right along, and at the close prices have advanced to 6.60@6.65c. New York, and 6.45@6.50c. St. Louis.

The London market is somewhat firmer at £28 12s. 6d. for ordinaries, and £28 17s. 6d. for specials.

Imports and exports of spelter in Great Britain for the 11 months ending Nov. 30 were as follows, in long tons:

	1904.	1905.	Changes.
Spelter	80,247	81,554	I. 1,307
Zinc sheets, etc	20,607	19,307	D. 1,300
Total imports	100,854	100,861	I. 7
Exports	7,391	6,960	D. 431
Balance imports	93,463	93,901	I. 438

Imports of zinc ores are not reported separately.

Zinc Sheets.—The price of sheet zinc is $7.75 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 and 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50; December 1, $7.75. The demand is reported active.

Spanish Zinc Ore Market. — Messrs. Barrington & Holt report from Cartagena, Spain, under date of Dec. 2, that prices are nominally unchanged at 95 fr. for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. There has been no change in the local prices, owing to the slight movement in the price of spelter. Several of the large mines, however, are closing contracts for their production for the coming year on a spelter basis. Exports for the week were 1,675 tons blende to Stettin, and 2,817 tons blende to Antwerp.

Antimony.—The supplies on hand of this metal are very low and premiums are being paid for quick deliveries. The future position also shows higher prices and closes at 13½ to 15c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York, or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—Prices in New York continue steady at $40 per flask for large orders—over 100 flasks—and $40.50 for jobbers' lots, down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $41.75@$42.25 per flask. San Francisco prices are steady at $39 for domestic orders, and $37.50 for export. The London price is £7 5s., but second hands ask only £7 2s. 6d. per flask.

Imports of quicksilver into Great Britain, with re-exports of foreign metal, for the 11 months ending Nov. 30, were as follows, in pounds:

	1904.	1905.	Changes.
Imports	2,475,206	2,519,586	I. 44,380
Re-exports	1 868,299	1,512,438	D. 355,861
Net imports	606,907	1,007,148	I 400,241

The larger part of the imports is from Spain.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 50 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	480
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted as 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen. These alloys are made by the Isabellenhütte, in Bonn, Germany, which is represented by Mr. Speier in Breslau as selling agent.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled sheets	4c. up.
Aluminum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (60%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro Chrom. (75%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@98% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.) (oz.)	40c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Dec. 16.

The highest price paid for zinc was $54.50 per ton, with an elastic assay basis—from $47 to $51 per ton of 60% zinc. This is occasioned by the lighter demand for medium- and low-grade ores the past five weeks, which has permitted these grades to accumulate to such an extent that, even with an increased demand for this week, the basis was further widened.

Lead prices attract most attention now, a further advance of $2 per ton this week brings the increase in eight weeks to $15

per ton. At least two carloads sold at $78 per ton, and 80% grades brought $77 per ton. The St. Louis Smelting & Refining Co. came into the market again this week, indicating the possibility of a still stronger market, and it is confidently expected that $80 will be paid before the end of the year, and it is predicted that lead will go to $84 before declining.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City	2,371,760	778,790	$84,520
Joplin	2,418,280	246,520	67,530
Duenweg	693,270	246,060	25,410
Galena-Empire	787,480	117,700	22,640
Alba	581,100	.....	14,810
Aurora	853,550	.....	13,370
Neck City	430,120	.....	10,960
Oronogo	225,760	24,710	8,260
Granby	445,000	33,000	8,050
Sherwood	234,470	15,310	6,090
Spurgeon	334,190	21,400	5,430
Badger	219,400	.....	5,260
Prosperity	91,870	56,770	4,290
Reeds	66,930	.....	1,600
Central City	68,030	.....	1,560
Beef Branch	67,820	14,820	1,270
Carthage	42,910	.....	1,090
Scott City	.....	17,590	660
Totals	10,031,940	1,572,670	$282,800
50 weeks	487,174,370	60,984,780	$12,813,970
Zinc value, the week,	$222,510;	50 weeks,	$10,937,575
Lead value, the week,	60,290;	50 weeks,	1,876,395

Wisconsin Ore Market.

PLATTEVILLE, Dec. 16.

The market conditions are still favorable. Monday buyers were offering $52 for 60% zinc ore. Before the close of the week the majority of the buyers were offering flat prices for the ore, in some instances the $52 mark was entirely disregarded. The high price offered for lead caused several of the producers to load what they had been holding. Fancy grades brought as high as $34.50 per thousand.

The different camps located in the Platteville zinc and lead district report ore loaded as follows:

	Zinc, lb.	Lead, lb.	Sulphur, lb.
Platteville	394,210	.....	.....
Livingston	110,000	.....	.....
Benton	106,000	.....	.....
Monfort	.....	.....	80,000
Shullsburg	86,340	69,490	.....
Mineral Point	62,450	.....	.....
Buncombe-Hazel Green	166,700	484,000	.....
Highland	106,600	64,000	.....
Linden	222,450	.....	40,000
Harker	72,000	.....	.....
Total	1,326,750	617,490	120,000

The prospect for continued strong ore prices seems excellent.

Mining Stocks.

New York. Dec. 20.

A break from the high point of last week has characterized the stock market. Perhaps the moving cause was the failure of a prominent bank in Chicago, which has been tied up in railroad and coal schemes in Indiana. The fall and subsequent recovery, however, bear the marks of the management, which has been prominent in the market.

The big break was in Amalgamated Copper, which had been selling at par, but dropped to $93½, with subsequent recovery to $98¼. Tennessee Coal & Iron fell from $148 to $137, but rallied to $146. Sloss-Sheffield was not affected much, remaining steady about $90. United States Steel was also steady, closing at $37¾, with $104½ for the preferred.

On the outside market the chief sensation was a heavy fall in United Copper. On Monday it broke from $68 to $48, but recovered to $60; the preferred closed at $85½. The other coppers showed only slight changes, Utah closing at $37½, after selling down to $34. Nevada Consolidated closed at $11, and Tennessee at $49½, a loss of $2½ per share.

On the Consolidated Exchange there was little doing in the Comstocks. Of the Nevada stocks, Sandstorm showed sales at 59@60c.; Original Bullfrog, 22c. There were sales of some stocks not often prominent. Alice brought $1.35; Kendall, 38c.; Work, 8c. Standard Consolidated sold at $3.85 for 200 shares.

Boston. Dec. 19.

It has been a rather strenuous week in mining shares and withal very active. Bullish enthusiasm still prevails, although the market is still spotty. Lake mining shares continue under the ban—that is, for the rank and file. United Copper continues on its upward course, rising $10.75 to $68.25. In Monday's break it touched $54, which was $6 above the low price on the New York curb the same day; today it rallied to $61.50. North Butte also had a sharp break Monday. After rising $7.50 to $93, it broke to $76.75, recovering to $85.25 today. Amalgamated rose $3.75 to $102.12½ last week, but Monday's break touched $95.50; today, however, it rallied to $100 per share, closing $1.25 below this. Copper Range touched $83.25, but broke to $78, Monday, with recovery to $80.75 today, closing with a net decline of $1.50 for the week, at $80. Greene Consolidated has been an active feature, rising $2.87½ to $32, closing tonight at $30.37½, ex-dividend.

Bingham Consolidated, which touched $37.50, fell back to $35, while Boston Consolidated is up $1.87½ to $27.25. The latter company's net earnings for November amounted to $58,000. Utah Consolidated settled from $58 to $55.75, closing at $54, ex the $2.50 dividend declared late last week.

Dominion Iron & Steel was a conspicuous feature, rising $5 to $28, and closing $3.25 below this. Tennessee Copper was taken in hand and given a sharp spurt of $12 to $53.50. Parrot sold up $3.62½ to $34.62½, but fell back to $32.50, while Michigan has been rather freely offered and is down $1 to $16.50. Osceola has been heavy also, and is off $3.75 to $105.25, while Tamarack is off $2 to $121. Wolverine, on the other hand, advanced $6 to $134.50, which is its record price. Quincy is buoyant, closing at $109, on expectation that the directors will increase the semi-annual dividend from $2.50 to $3 in January. Trinity spurted $2.62½ to $12.50, but lost all the gain, and United States is up $1.62½ to $41.12½. There is no market for Winona and the stock is off $1.50 to $7.50

The curb has continued active, with Arizona Commercial and Utah-Apex the most conspicuous. The former rose $1.75 to $26.25 and the latter $1.62½ to $9.25. Arizona Commercial has not yet been listed on the exchange and that body seems to be holding off from taking action on it. It is understood that an offer of $20 has been made for 20,000 shares of this stock. Shawmut Consolidated touched $4.25 on very active curb trading. The latter owns 80 acres in the Bingham camp. Utah Copper is up $2.50 to $37.50. Keweenaw has been inactive and in off $3 to $16. The company has taken over the Resolute, Mandan and Wyoming properties. Active times are expected in Keweenaw later on.

San Francisco. Dec. 13.

A little recovery early in the week was followed by some dullness, and the market gradually developed a weaker tone for the Comstocks. Ophir closed around $6; Consolidated California & Virginia, $1.35@$1.40; Hale & Norcross, $1.20. Other stocks show a lower range.

The Tonopahs were in good demand. Dealings were on quite a large scale. It is reported that there is a large short interest in some of these stocks. Montana Tonopah closes at $2.40; Tonopah Belmont, $1.90; Jumbo, $1. The chief interest was in the three stocks named.

Oil stocks were quiet. Monte Cristo sold at 75c.; Arline, 30c. Buying orders were not much in evidence.

The sworn returns of the mining companies, as filed in their offices this week, report cash on hand on Dec. 1 as below, with all expenses paid, unless otherwise noted: Alpha Consolidated, $972; Alta, $689, with liabilities of $4,074; Andes, $2,986; Belcher, $1,505; Bullion, $1,176; Best & Belcher, $208, with indebtedness of $1,000; Caledonia, $6,628, with November expenses unpaid; Consolidated California & Virginia, $3,575; Confidence, $4,678, with November expenses unpaid; Chollar, $826, with indebtedness of $431; Crown Point, $6,938; Challenge Consolidated, $3,757; Consolidated Imperial, $1,737; Exchequer, $2,475; Gould & Curry, $88, with indebtedness of $390; Hale & Norcross, $3,137; Julia Consolidated, $189; Justice, $2,205; Mexican, $6,261; Ophir, $33,023, with 10 carloads of ore in transit; Overman, $504, with November expenses unpaid; Potosi, $1,935; Savage, $6,828; Scorpion, $793; Silver Hill, $16,031; Segregated Belcher, $3,133; Sierra Nevada, $1,929; Syndicate, $89; Standard Consolidated, $35,561, with November expenses and November clean-up to be accounted for; Union Consolidated, $2,339; Utah, $46, with $3,000 indebtedness.

Colorado Springs. Dec. 15.

Comparative quiet has prevailed on the local mining exchange. The district is being worked up to its full capacity and the present production equals that of any time in the history of the camp.

Acacia has been selling from 11¾ to 12½c. Elkton sold up to 50, but closed on today's market at 46c. Portland sold during the week for $2.10. El Paso sold during the week as high as 65, but closed on today's market 62½@65c. Findley sold today for 73c.; Anaconda for 13c.; Isabella at 24c. C. K. & N. was sold today for 7c., the first sale for some time.

Dividends.

Company.	Payable.	Rate.	Amt.
American Cement Co.	Jan. 10	$0.30	$60,000
Am. Smelting & Ref.	Jan. 15	1 75	875,000
Am. Smelting & Ref., pfd.	Jan. 2	1.75	875,000
Calumet & Hecla	Dec. 20	15.00	1,500,000
Copper Range Con.	Dec. 23	1.00	383,781
Crucible Steel, pfd.	Dec. 29	1.00	250,000
Empire Steel & Iron, pfd.	Jan. 1	1.50	37,500
Gen. Chemical, pfd.	Jan. 2	1.50	150,000
Granby Con.	Jan. 15	0.30	399,991
Greene Con. Copper	Dec. 30	0.40	345,600
Guggenheim Exploration.	Jan. 2	1.75	183,750
Homestake	Dec. 23	0.50	109,200
Horn Silver	Dec. 30	0.05	20,000
Iron Silver	Jan. 1	0.20	100,000
Maryland Coal Co.	Dec. 30	4.50	84,825
North Star Mines	Dec. 22	0.50	125,000
Republic Iron and S., pfd.	Jan. 2	3.12½	638,020
Rocco Homestake	Dec. 26	0.02	6,000
St. Mary's Min. Land	Jan. 1	1.00	150,000
Teziutlan Copper	Jan. 1	2.25	180,000
Utah Con., Utah	Jan. 15	2.50	750,000
Virginia-Car. Chem., pfd.	Jan. 15	2.00	360.000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Brunswick-Chollar	Dec. 30	Jan. 22	$0.03
Bruswick Con. Va.	Dec. 28	Jan. 18	0.05
Brunswick-G. & Curry.	Jan. 12	Jan. 31	0.03
Brunswick-Potosi	Dec. 13	Jan. 2	0.03
Brunswick-Savage.	Dec. 12	Jan. 2	0.03
Bullion	Jan. 11	Feb. 1	0.05
Cedar Creek, Cal.	Dec. 24	.....	0.004
Chollar	Dec. 18	Jan. 8	0.10
Con. New York	Dec. 15	Jan. 2	0.03
Dutch Mg., Cal.	Dec. 26	.....	0.05
Gould & Curry.	Dec. 22	Jan. 10	0.10
Julia Con.	Jan. 6	Jan. 29	0.03
Orient Gold Placer	Dec. 30	.....	0.05
Overman	Jan. 3	Jan. 22	0.10
Purington, Cal.	Dec. 26	.....	0.01
Segregated Belcher	Dec. 8	Dec. 28	0.05

St. Louis. Dec. 16.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.17	.15
Center Creek	2.20	1.70
Central Coal & Coke	64.00	62.50
" " pfd.	81.00	80.00
Central Oil	60.00	55.00
Columbia	1.50	.50
Con. Coal	33 00	31.00
Doe Run	200.00	173.00
Granite Bimetallic	.20	.15
St. Joe	25.50	21.50

LONDON. (*By Cable.**) Dec. 19.

	£	s.	d.
Camp Bird	1	10	0
Consolidated Gold Fields	5	16	3
De Beers	17	12	6
Dolores	2	3	6
East Rand	6	5	0
El Oro	1	9	3
Esperanza	5	7	6
Modderfontein	7	3	9
Rand Mines	7	6	3
Rio Tinto	67	7	6
Simmer and Jack	1	10	0
Stratton's Independence	0	6	9
Tomboy	1	7	6

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Dec. 20.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	102⅛	93⅛	98⅜	925,285
Anaconda	196	180	185	153,150
British Col. Copper	10¾	8⅛	10½	96,700
Federal	141	136	136	1,013
Federal, Pf.	110¼	106⅛	108¼	16,026
Greene Copper	32	29¼	30½	92,400
Greene Gold	4¼	3⅞	3⅞	3,580
Homestake	82	82	82	200
Mitchell	9⅞	9¼	9⅝	2,300
Ontario	3⅞	2¾	2¾	480
Tennessee Copper	54	42	51	51,445
Union Copper	2⅛	1⅛	2⅛	16,000
United Copper,	68⅛	48	60⅛	208,200
United Copper, Pref.	88⅛	83	86	3,780
Utah Apex	9⅛	7⅛	8⅛	21,700

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	164⅝	158½	162	236,600
Am. Smelting & Ref., Pf.	137	129½	129½	45,900
National Lead	89⅜	83¾	87	131,000
Pittsburg Coal	17⅛	14⅞	16	1,250
Pittsburg Coal, pf	63⅛	58½	61⅛	3,900
Republic I. & S.	34¾	32⅛	34½	65,667
Republic I. & S., Pf	108	103¼	103⅜	18,532
Tenn. C. & I.	148	137	144	52,600
U. S. Red. & Ref.	3.¾	31	32⅛	5,700
U. S. Red. & Ref., Pf.	72⅛	69⅝	72	2,450
U. S. Steel	39	37	37¾	426,915
U. S. Steel, Pf	105¾	103⅝	104⅝	114,670
Standard Oil	684¾	675	681	249
Bethlehem Steel	33	31⅞	32	1,266

BOSTON

Allouez	41⅜	40	40¼	2,328
Amalgamated	102½	95⅛	98¾	80,517
Atlantic	24½	23	23⅜	3,461
Bingham	37½	35	35	10,210
Boston Consolidated	27¼	24	27	38,480
*Calumet & Hecla	720	705	710	309
†Centennial	30½	28	28	3,609
Mercur	.62	.60	.61	1,580
*Copper Range	83¼	78	80	31,466
Daly-West	19½	17	18	5,811
Franklin	18	17	17¼	2,550
Granby	10¼	9⅞	10	4,720
Green Con. Copper	32½	29¼	30¼	69,807
Isle Royale	24⅞	23	23¼	4,090
†Mass	10⅜	9½	9⅞	2,331
Michigan	17⅜	16	16½	4,940
Mohawk	64	61¾	62½	3,527
*North Butte	93	76¼	84¾	65,598
*Old Dominion	34¾	32¼	33	4,991
Osceola	109	105¾	105¼	3,070
*Parrot	34⅞	31	32¾	15,308
Phoenix	1⅝	1¼	1⅜	580
Rhode Island	6	5½	6	792
Shannon	7¾	7⅛	7¼	4,365
Tamarack	124	120	121	445
Tecumseh	12½	11¾	12	1,680
United Copper, com.	68¾	54	60⅞	75,554
U. S. Mining	41⅛	39¼	41	15,373
Utah	58	55¾	53¼	18,287
Wolverine	134½	127	134	1,007

PHILADELPHIA.

Cambria Steel	28⅝	28	28⅛	2,612
Philadelphia Co.	52⅜	51⅝	52	708
Tonopah	16	13	16	8,487

PITTSBURG.

Crucible Steel	14	13½	13½	5,032
Crucible Steel, Pref.	71⅛	68½	69¾	8,738
Tonopah Ext.	5.75	5.35	5.50	2,285

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	48	48	46	46¾
El Paso	63½	64¾	62	61
Isabella	24	24¼	24	24
Portland.	205	205	200	200
Vindicator	70	70	70	70

SAN FRANCISCO.

Best & Belcher	1.35	1.40	1.30	1.35
Bullion	.25	.25	.25	.25
Caledonia	.54	.63	.53	.53
Confidence	.85	.86	.83	.83
Con. Cal. & Va.	1.35	1.40	1.30	1.35
Gould & Curry	.14	.23	.12	.23
Hale & Norcross	1.10	1.15	1.10	1.15
Mexican	1.35	1.45	1.35	1.35
Occidental Con	.96	1.00	.95	.95
Ophir	6.00	6.12	5.87½	5.87½
Savage	.51	.54	.50	.51

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	62.034	26.760	28.637
November	58.453	63.849	26.952	29.493
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March.	12.299	15.125	12.551	15.250	57.321	68.174
April.	12.923	14.920	13.120	15.045	58.247	67.017
May.	12.758	14.627	13.000	14.820	57.321	64.875
June.	12.269	14.673	12.399	14.813	56.398	65.881
July.	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct.	12.993	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	16.599	14.456	16.758	65.085	74.727
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July.	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
March.	28.317	29.523	Sept.	27.780	32.096
April	28.132	30.525	Oct.	28.596	32.481
May.	27.718	30.049	Nov.	29.185	33.443
June.	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July.	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
March.	4.475	4.470	Sept.	4.200	4.850
April.	4.475	4.500	Oct.	4.200	4.850
May.	4.423	4.500	Nov.	4.200	5.200
June.	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January.	4.863	6.190	4.673	6.032	25.063
February.	4.916	6.139	4.717	5.989	24.594
March.	5.057	6.067	4.841	5.917	23.825
April.	5.219	5.817	5.038	5.667	23.813
May.	5.031	5.434	4.853	5.284	23.594
June.	4.760	5.190	4.596	5.040	23.875
July.	4.873	5.396	4.723	5.247	23.938
August.	4.866	5.706	4.716	5.556	24.675
September.	5.046	5.887	4.896	5.737	26.375
October.	5.181	6.087	5.033	5.934	28.225
November.	5.513	6.145	5.363	5.984	28.500
December.	5.872	.....	5.720	.....	.....
Year.	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.